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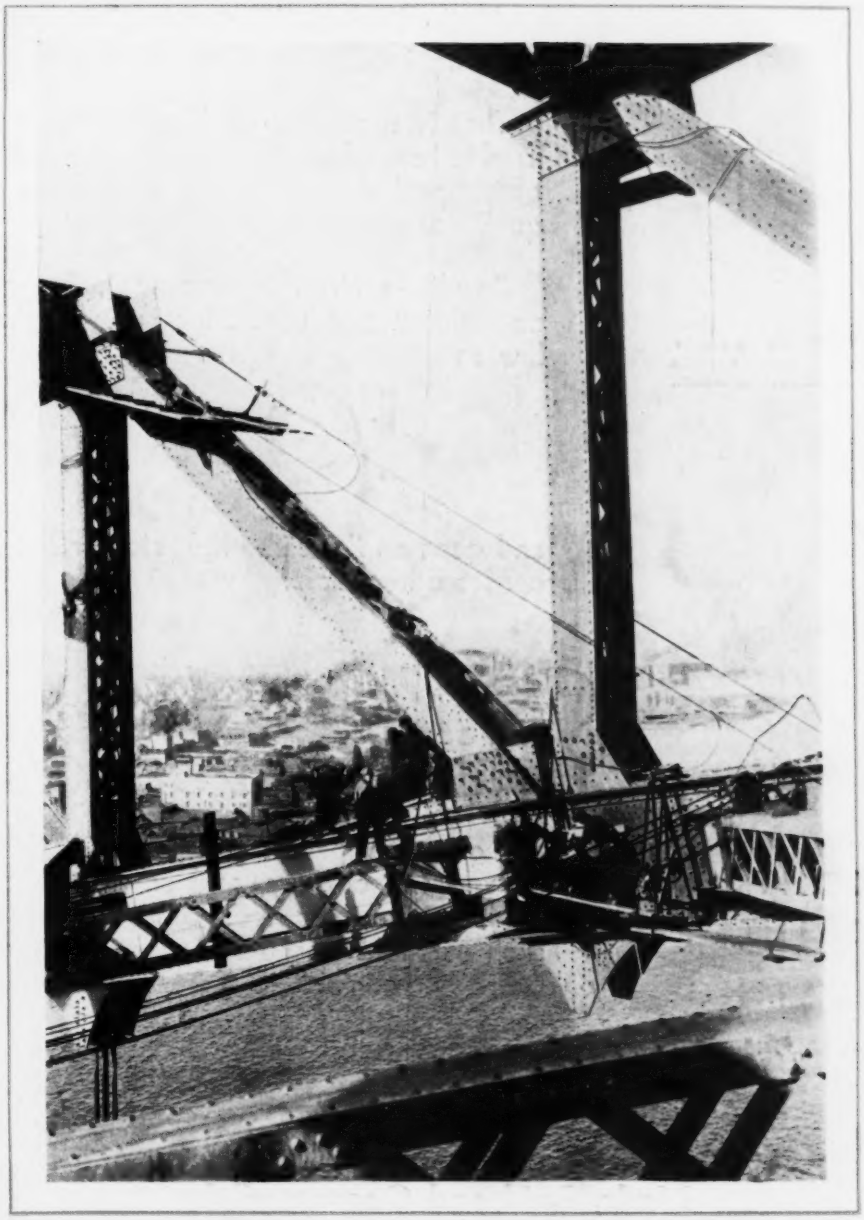


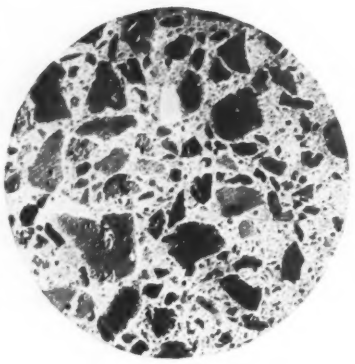
TWO INCHES TO GO—KILL VAN KULL ARCH CLOSURE

In This Issue:

Erecting Two Great Steel Arch Bridges

Kill van Kull in New York Sydney Harbor in Australia

TRAPPED AIR CELLS



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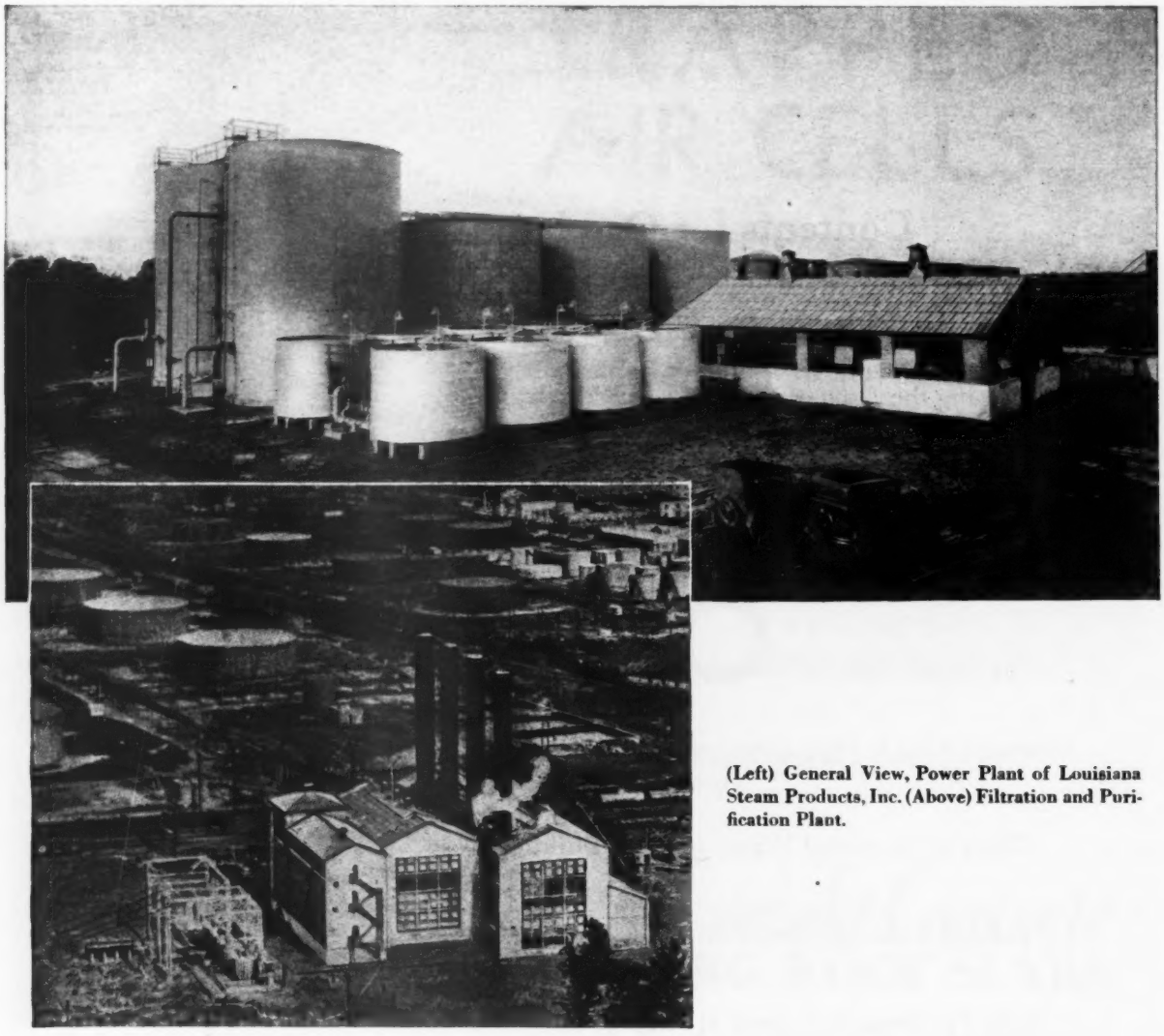

(Left) General View, Power Plant of Louisiana Steam Products, Inc. (Above) Filtration and Purification Plant.

2,000 Gallons a minute - -

A filtration and purification plant flexible enough to remove from 6 to 120 tons of river silt a day was one of the features in the construction of the power plant for the Louisiana Steam Products, Inc.

The plant, located on the Mississippi River near Baton Rouge, La., supplies six billion pounds of steam a year to the oil refining plant of the Standard Oil Company of Louisiana. Both power plant and filtration system were in operation five months and twelve days from the time ground was broken.

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DEVOTED TO CIVIL ENGINEERING AND CONTRACTING

F. E. SCHMITT, *Editor*

Volume 105 NEW YORK, OCTOBER 23, 1930 Number 17

A New Christening

LONG ago it was said that a rose by any other name would smell as sweet. Yet it is fitting that names should give true definition of that to which they are applied. In this spirit we welcome the renaming of the American Society for Municipal Improvements. During 36 years it has aimed to serve city officials under the old name, but in time its membership came to have almost exclusively an engineering character. It is therefore proper that the society should bring its name into consonance with the character of its membership, programs and committee activities. Under its new name of American Society of Municipal Engineers it has a wide field, a serious mission and a definite responsibility to American urban development. May it increase in strength and productiveness under its new name!

A Deserved Honor

IN AWARDING honors to veteran city engineers last week the new American Society of Municipal Engineers did a graceful and timely act. In these days of rapid political turnover it is heartening to the profession to have brought to its attention the fact that there are cities, and elected officials in them, that recognize the value of efficient engineering service. In presenting medals to Robert Ridgway, Edward S. Rankin and John F. Skinner the society honored itself as much as it distinguished them. The president of the society, P. L. Brockway, himself a veteran in the service of Wichita, pointed out that there are 25 members with records exceeding a quarter century of service to one municipality. It is a remarkable expression of steadfastness of purpose and loyalty of service. Honor to the men of long service is appropriate recognition of that which is a traditional characteristic of the engineer—faithfulness and efficient performance.

Handicaps to Effectiveness

IS ENGINEERING COUNCIL to become a mouthpiece for the airing of private views, or is it to be held to its basic purpose? Two recent developments raise the question. Some months ago it was used as the instrument of a personal attack upon the Corps of Engineers; within the past few days a personal proposal for dealing with Mississippi River problems was sent out to the country so securely tied to the name of American Engineering Council as to indicate to the layman that the scheme had the approval of that body. Both incidents suggest that some individual members fail to value their responsibilities, and that the council itself is lax in protecting its high position. Engineering Council has an important mission as the spokesman for the entire engineering profession, but its effectiveness will be destroyed unless it can be kept upon a plane of public service free from personal interests, individual opinions and prejudice.

Transportation in Cities

BUENOS AIRES has just completed a new section of rapid-transit subway. Tokyo is in process of building part of a similar network. Rome is about to begin subway construction. These three bits of news are especially interesting in connection with the fact that, judged by census findings, no check to city growth is yet discernible. They throw a strong light on the central place which transportation occupies in the life of cities. At present the importance of urban transportation is increasing sharply. No city claims to have reached a solution even of today's problem, much less of the larger future problem. Everywhere transportation is too slow, too crowded, and too cumbersome in its interference with other physical elements of the city. Provision of effective rapid transit is tremendously costly. All that can be concluded on the basis of experience so far is that decentralization of city activities offers the only avenue of escape from the hopeless complexities of the transportation problem; but the practical fact is that city life does not of itself tend to decentralize, and no one has succeeded in finding a way to compel it to do so. Increased expenditures for rapid-transit construction are therefore inevitable in all metropolitan communities. Until some new factor enters the situation it is certain that dealing with transportation will continue to be the most critical engineering problem of the large city, here as well as elsewhere in the world.

European Concrete Road Advance

THE reports of European engineers at the International Road Congress indicate that highway administrations over there are doing less groping about than formerly among special methods and materials for concrete roads. At the congress of 1926 major attention was focused on special-cement concretes and on questions of staggered slab placement and other procedures to avoid temperature and subgrade hazards. At the 1930 congress slab sequence and joint construction proved to remain critical questions, but the advocacy of special-cement concrete seems to have disappeared rather completely. Roads of special, patented materials are being built in lessening volume; where they are still used the opinion is commonly expressed that any value they have is due to excellent concrete practice and not to the compounding of special materials. It is announced that equally good results are being obtained with normal portland cement as with special cement, under proper concrete control. But in Europe the vital question of

abrasive wear under steel tires continues to be prominent. There is definite approval of two-course concrete, a base course of a lean mixture and a wearing course of dense concrete of hard aggregates to resist abrasion. Steel-tired traffic in large volume and considerable intensity of loads must have consideration, and the two-course slab is held by most to be the cheaper means of doing it. Not all agree with this view, however. As some of the reports clearly indicate, the opinion is growing that any economy and increased wearing qualities of two-course construction are more than offset by structural faults which are avoided in one-course construction. Altogether it is being indicated in various significant ways that concrete road practice abroad is coming into closer agreement with the experience in America that one-course construction of normal concrete mixtures is generally preferable for concrete roads. This sentiment, it is believed, is certain to increase as rubber-tired motor vehicles replace the animal-drawn steel-tired vehicles now in such common use.

Cement-Macadam Possibilities

REVIEW of the reports to the International Road Congress on the use of hydraulic cement in highway construction discloses one application that has interest to American engineers and is entirely unknown in their practice. The cement-macadam of Europe is to this country a new thought in secondary road construction, and it has received enough favor abroad to entitle it to consideration by American road builders. The construction processes, as explained in this issue, are simple and the costs are small. Experience in Europe is not in full agreement on the service merits of the construction, but the reports made to the International Road Congress sound a note of optimism. Abroad the process has been employed exclusively for broken-stone roads, it seems. Its possibilities with gravel surfacing would be more interesting to engineers in this country, particularly if cement were found susceptible of application by the mixed-in-place machine processes that have been so successful in oil-mixed gravel road building. As compared with oil-mixed gravel an apparent drawback to cement-macadam is its rigidity when once set up. This makes redressing and restoration of surface smoothness—a very simple task with an oil mix—rather difficult if not impossible. Indeed, experience in Belgium has virtually condemned cement-macadam for this reason. Yet the type stands as the chief or only contribution of Europe on the use of cement in road building that has possible appeal for practical consideration by road builders on this side of the Atlantic.

New Thought on Dams

CERTAIN significant trends of change in the field of dams are suggested by the story of the engineering methods applied at Rodriguez dam, outlined last week. The work there invites admiration, for dam builders have rarely been called upon to solve a more troublesome foundation problem and rarely have they exhibited more resourcefulness. But the conditions encountered suggest that the engineering of dams is probably entering a period of change. The better dam sites have largely been appropriated, and future provision of water storage will therefore have to deal with less satisfactory locations, poor ground, faults, and many special complications that heretofore could be avoided. Geological considerations evidently will have increased weight under these circumstances. But the engineer himself will need a broader and more openminded approach to his work than is required for the standardized practice of dam engineering. Where accepted forms of structure appear unsuited to the special conditions of difficult locations, originality of conception combined with thoroughly sound appreciation of fundamental principles will be his essential asset, equally in construction and in design. This is a general and perhaps a trifle visionary conclusion; but the faulted site of the Rodriguez dam, its arched foundation and its unique cut-off wall are special matters of a kind that may be expected more and more frequently. They indicate clearly that the future affords large opportunity for new thinking on dams.

Losing Nerve?

AT THE executive board meeting of the Associated General Contractors, two weeks ago, a resolution was passed asking the Secretary of the Interior to provide some form of contract for the construction of the Boulder dam that will permit competitive bidding but yet will not result in risk of excessive profit or excessive loss to the contractor. Are contractors losing nerve? Several years ago the A.G.C. announced with pride its part in influencing the Bureau of Reclamation to adopt the contract basis of carrying on construction work instead of the former force-account practice. Conforming to the policy then established, the Department of the Interior has stated its intention of awarding contracts for the construction of the Boulder dam, and has already started work on that basis. Now that the chance of building a great government project is offered them, the contractors back down and ask for some modified form of contract that will assure them protection. Is this an indication that they are unwilling to stand on their own feet and their own responsibility and tackle an unusually heavy piece of construction without asking odds?

Reasons for this request by the A.G.C., as stated in the resolution, may be summed up thus: This project will require several years for its completion—a period of time during which it will be most difficult to forecast with any degree of accuracy the cost of necessary materials and labor. Uncertainties in estimating the cost of construction necessarily require the prudent contractor to resolve all doubt in his favor in computing and submitting his bid. These are the essential reasons. We do not believe they justify the action taken.

In the first place, the danger of floods, admittedly the greatest risk in building the dam, is minimized by the government's plan of first completing the four 50-ft. tunnels for diversion and floodflow. In the second place, the project will not be built under a single contract, but will be split up into several awards. One of these smaller contracts, for the construction of the connecting railroad, has already been let. Others will be let for the tunnels, for the dam and power house, and for other appurtenant work. Single contracts comparable in size to any to be let for Boulder dam have been taken in the past without hesitation. One example is the driving of an 18-mile water tunnel in New York City, awarded on a straight contract basis for a total in excess of $42,000,000.

The statement that material and labor prices will be undeterminable over the long period of time required for construction seems farfetched. In all probability the contracts will not be let simultaneously, but will follow

in logical sequence as the work progresses. The contract forthe dam and power house will probably be the largest single award on the project. For this construction cement and form lumber will be the main material items, and it is certain that a contractor will be able to secure one price on these commodities for the duration of the job. Considering labor prices, we expect this project to be the most completely mechanized piece of construction yet to be built. Its very magnitude demands the utmost in the use of machinery. We cannot see that possible increases in wage scales will materially affect the cost of the work.

No doubt there will be risks for the contractor building the Boulder dam. There are risks on every construction project. But to relieve the contractor of inherent risks reduces him to the status of a hired agent—a situation the construction industry is rebelling against.

Our faith in the contracting industry is such as to lead us to believe that it can stand on its own feet, tackle a job like Boulder dam, and carry it to satisfactory completion at a reasonable cost to the government, without demanding a subsidy or some form of protection. Any other stand will be a backward step in the industry's fight to gain the confidence and respect of the public.

Two Great Arches

ON OPPOSITE sides of the world two great steel arch bridges are in the course of erection. Neither is approached in length of span by any similar structure, and only the Hell Gate arch rivals them in magnitude. One, the Sydney Harbor bridge in Australia, is the result of British engineering genius; the other, the Kill van Kull bridge at New York City, is an American product. Both are epochal structures, setting new heights of attainment in structural analysis, rolling mill practice, use of new materials and fabrication and erection of structural steel. The Sydney Harbor bridge is the greater of the two, except in span length, and while an actual comparison of physical characteristics is available on another page of this issue, it is incidental. The real basis upon which the bridges should be considered is one of accomplishment. What have they demonstrated in the way of progress and possibility?

The fact that the arch has entered the field of long-span bridges, heretofore dominated by the suspension and cantilever types, is important. In both instances the arch was selected only after careful analysis of the several available designs. The suspension bridge was ruled out largely on the basis of lack of rigidity for railway loads. At the same time the competition staged for the Sydney Harbor bridge developed several suspension designs of unusual rigidity, among them a braced-chain structure by Lindenthal and a suspended cantilever by Steinman, later approximately incorporated in the Florianopolis bridge in Brazil and the Ohio River crossing at Point Pleasant, W. Va. Comparative cost estimates made by the Kill van Kull engineers showed a saving for the arch over the suspension bridge, but the amount was small, and being theoretical and approximate at best the computed economy in cost cannot be taken as conclusive. Esthetic considerations played the most conspicuous part in eliminating the cantilever, although several pleasing designs were submitted, for the Sydney Harbor crossing. Foundation conditions at both sites were ideal for an arch, and particularly so at Kill van Kull.

Structural analysis, both mathematically and by model, has been given impetus by virtue of these bridges. Experience with their design provides added proof of the accuracy of modern computations. Even in some of the complex indeterminate systems resulting from the method of erection used on the Kill van Kull bridge, the calculated actions of the members were checked almost exactly by strain gage readings made during construction. Study of a brass model of the Kill van Kull arch (one of the few instances in which a model of a complete structure rather than a plane model has been used) gave entirely reliable measurements of deflection and stresses; it also disclosed, somewhat unexpectedly, how effectively the arch is stiffened by the swaybracing near the ends of the span and how little rigidity is provided by swaybracing near the center. The model also afforded a means of checking the rigidity of the arch portals, always particularly vital spots in arch designs.

The successful rolling of silicon steel plates 2⅛ in. thick (Sydney Harbor) and of carbon-manganese steel plates 1½ in. thick (Kill van Kull) for such exacting service as that required in these bridges represents technological development of high potentiality. The use of carbon-manganese rivets is of much promise and may in fact transcend in importance all other contributions made by the projects. Theoretically, stronger rivets will permit a reduction in the number of rivets used in any single joint, will decrease the size of required gusset and splice material, and will provide a more compact joint of higher efficiency than is obtainable with ordinary rivets. Nickel and silicon steel rivets have in the past proved unsatisfactory, so that the carbon-manganese steel rivets at Kill van Kull give hope of realizing some of the theoretical advantages long sought in stronger steel for rivets.

It is in a consideration of the erection of the arches, however, that they are most impressive. The arch has long been considered the most difficult, the most uncertain and therefore the most dangerous of bridges to construct. Once completed, it ranks high in effectiveness and efficiency, but until it is closed, at the very end of the erection operation, its two halves are dangerously unstable. Because of this fact the Sydney Harbor and Kill van Kull arches are the more remarkable since they are not the product of a slow evolution; without benefit of precedent, they surpassed the 1,000-ft. span of the Hell Gate bridge by more than 60 per cent.

At Sydney the cable anchorages were untried on a bridge of more than 600-ft. span. Yet they worked so effectively on the 1,650-span and their stresses were so completely under control by virtue of ingenious hydraulic jack and vibration measurements that similar anchorages must command careful consideration when even longer arches are projected. At Kill van Kull, too, the unusual method of cantilevering from progressively placed falsework bents demonstrated truly remarkable results. The elimination of any sort of artificial anchorage, with this erection method, provides reason to believe that the arch is no more limited in span length by virtue of available erection methods than is the suspension bridge.

Originality, boldness, perseverance—common but characteristic attributes of most engineering projects—have been demonstrated again by these arches. They contribute their share to the modern assumption that engineering knowledge and experience are equal to whatever demands may be placed upon them. Engineering progress has been enriched. Possibilities for the arch of the future have been enlarged. The lessons learned from these two great bridges furnish additional firm ground upon which to base further advances.

The Closure Joint

Closing a 1,652-Ft. Steel-Arch Bridge 250 Ft. Off Center

Kill van Kull Bridge at New York Erected by Cantilever Method Using a Series of Steel Falsework Bents—Jacks in Alternate Bents Only—Closure on Pin in Lower Chord—Required Stress in Upper Chord Closing Member Produced by Raising Jacks at Top of Falsework Bent After Structure Was Swung as a Three-Hinged Arch

A REMARKABLE bridge-erection program, characterized by speed, efficiency and deft execution, was completed October 4 with the closure of the steel arch over the Kill van Kull, between Bayonne, N. J., and Port Richmond, Staten Island, N. Y. There still remains much to be done before the bridge is ready for traffic in 1932, but with the closure of the arch trusses the major erection job has been successfully accomplished. This job was unique in several respects: The arch is the longest yet built, 1,652 ft. 1 in., c. to c. of hinge pins and 1,675 ft. between bearing points on the abutments; it was erected by the cantilever method from falsework bents placed and released successively as erection proceeded; and closure was effected nearly 250 ft. beyond the center of the arch, a requirement made necessary by the location of the ship channel (in which no falsework was permitted) near the south shore of the Kill van Kull. The design of the bridge was described in *Engineering News-Record*, Dec. 13, 1928, p. 873.

No arch bridge approaching this one in magnitude has previously been erected with the use of falsework. Falsework was not practicable in Hell Gate and the arch over the East River at that point in New York City was erected as two cantilevers tied back to shore anchorages by an overhead system of tension members composed of approach girders. A somewhat similar procedure was used on the recently closed Sydney Harbor arch in Australia, except that an elaborate system of cables made up the tiebacks. The method of closing this latter bridge is outlined in an article in this issue on page 646.

As shown in Fig. 3, ten steel falsework bents were used in erecting the Kill van Kull arch, the contractor's program being to cantilever successively from bents located at panel points 1, 2, 4 and 7 on the south side and at 1, 2, 4, 7, 11 and 16 on the north side. The south cantilever was completed first, after which the erection traveler, which operated on the top chords, was dismantled and moved to the north abutment, from which point erection of the longer north arm was begun. Closure was made at panel point 14 on the south side, six panels beyond the center. At the time of closing, the cantilever arm and the anchor arm on the south side were each seven panels, or 289 ft., long. On the north side the cantilever arm was ten panels, or 413 ft. long, and the anchor arm 16 panels, or 661 ft. long. This erection scheme required the strengthening of several members by increase of section both temporarily and permanently, by the use of a higher grade of steel, or by both expedients.

As cantilever erection progressed each falsework bent was released from load after the arch had been landed on the bent beyond, except in the case of the bent at panel point 11 north, which assisted bent 16 in supporting the long arm until the arch was ready for closure operations to begin. Transfer of load from one bent to another was effected by jacking, with jacks provided at alternate bents only. Some jacks were at the top of the bents while others were in the shoes.

Falsework, South Arm

The falsework bent piers at points 1, 2 and 4 on the south side, (the bents later being removed and used at corresponding points on the north side) consisted of four groups of square timber piles, incased in steel boxes, with bracing tying the four boxes together. The piles were wedged to fit tightly against the sides of the boxes,

FIG. 1—KILL VAN KULL ARCH APPROACHING CLOSURE
Note toggle truss over top chord of north arm, which relieves stresses in the panels either side of the falsework support.

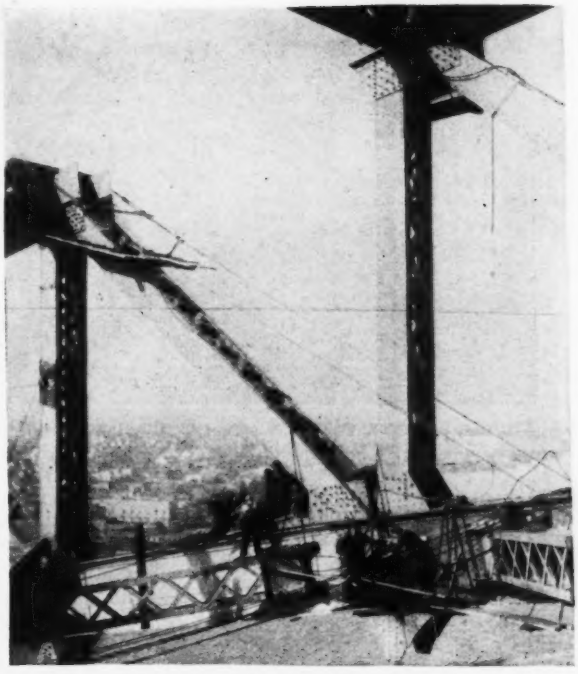


FIG. 2—CLOSURE JOINT, PANEL POINT 14 SOUTH
Arms separated 2 in. at time view was taken. Note temporary location of bottom chord lateral bracing.

which were sunk and held in position by means of corner spuds while the piles were being driven. Steel for the superstructures of these bents consisted largely of members from the bridge, such as bracing members and floorbeams.

At panel point 7 south, the pier for the bent which remained in position until the arch was closed, also consisted of four steel boxes, but utilized steel H-section piles (Fig. 4) incased in concrete instead of timber piles. This pier was protected by heavy fenders to guard against collision from ships or barges. The superstructure columns of bent 7 south, consisting of two floorbeams latticed together, were in two sections, each section weighing about 75 tons. Each column rested on a pin hinge at the bottom and carried a half pin at the top, which engaged a pinhole in a special extension to the gusset plates at L7. In order to place an initial stress in the bracing system (two panels of eyebar diagonals and three struts) and to prevent slackening of the diagonals, as the load of the arch caused compression in the columns, provision was made for jacks in the middle strut of this bent. The main jacks, used to pick up the load of the arch truss from bent 4 and later to manipulate the arch during closure, were placed in the top of bent 7, one 3,500-ton hydraulic jack to each column. The bent shown in Fig. 4 is similar to bent 7 with two panels of approach girders added to provide the additional height required at panel point 16 north.

Erection of South Arm

Briefly, the erection of the south arm was accomplished by first erecting a stiff-leg derrick on a temporary tower behind the abutment, this derrick assembling the erection traveler on the steelwork over the abutment, as indicated in Fig. 3. This steelwork was erected in a temporary position, providing an inclined track over which the traveler could reach the top chord of the arch. Erection then proceeded in the usual manner, cantilevering from each falsework bent in turn.

Special conditions prevailed at the shoes during erection of the cantilever arms. Until the arch was swung the reaction on the hinge pin of each arm was vertical, necessitating supports for the lower hinge forging and the structural-steel shoe upon which it rested. These supports, as shown in Fig. 8, had a bearing on a grillage mounted on the masonry shelf in front of the skewbacks. Tension connections tied the forging to the shoe and the shoe to the anchor frame (embedded in the abutment) to prevent overturning. Other requirements at the shoes related to resisting wind effects and consisted of special mountings for the hinge pins to eliminate fixity (Fig. 8) and of a tieback on the center line of the bridge between the abutment and the bracing at panel point 1. This tie resisted any tendency of the arm to move forward under an offshore wind. The fixed-end condition was eliminated by finishing a portion of the half pinholes in the forgings on a bevel of 1 to 10, instead of making them true semi-circular curves. This finishing, as shown in Fig. 8, permitted the pin to act as a roller over which the top forging, and therefore the arch arm, could move under wind loads.

No jacks were provided in bent 1, but those in the base of bent 2 were raised until the arch was lifted clear of the first bent. When erection reached the bent at panel point 4, in which no jacks were used, the jacks at bent 2 were lowered until the arch rested on bent 4, and then were lowered farther until bent 2 was released. Jacks in the top of the bent at panel point 7 were utilized to lift the arch clear of the bent at panel point 4. During all jacking operations shims were inserted in such an amount that the distance through which the structure could fall, should the jacks fail, was never more than

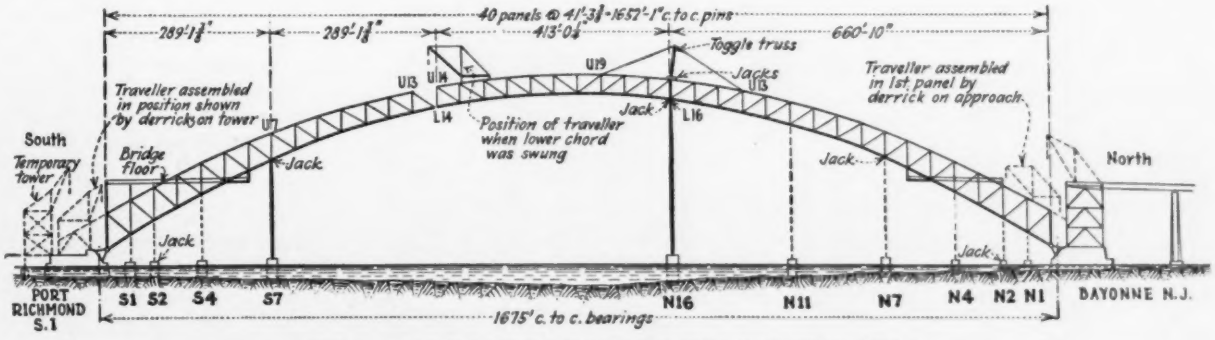


FIG. 3—FALSEWORK BENT LAYOUT, KILL VAN KULL ARCH
Bents indicated by solid lines are carrying load; those shown dotted have been released. Note that jacks were used at alternate bents only.

1 in. The arch was left supported on the jacks for only the minimum possible length of time.

During all cantilever construction the erection of the two trusses was kept as nearly as possible at the same stage. When a chord member was cantilevered the top and web splice plates at the rear connection were pinned and bolted to provide an ample factor of safety against the bending and shear resulting from the weight of the chord. All chord joints were fully fitted up with drift pins in not less than 60 per cent of the holes and bolts in the remainder. Riveting followed closely behind erection. This was doubly important, since the joints, which were designed to use manganese steel rivets, could only be made to develop about 50 per cent of their strength with drift pins and bolts. None of the bracing member connections to the chords in the cantilever arms beyond the last falsework support under each arm was riveted until after the arch was closed.

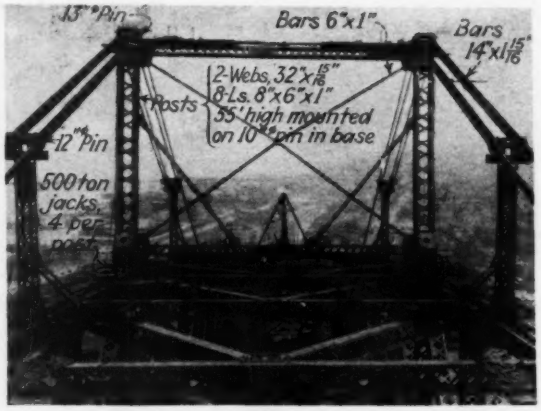


FIG. 5—TOGGLE TRUSS OVER UPPER CHORD
Post is over U16 north with eyebars sloping down to a 16-in. diameter pin attachment at U13 and U19.

The North Arm

The first stages of erection on the north arm were similar to those on the south arm, except in minor particulars. As shown in Fig. 3 the arch traveler at the north end was erected by the approach traveler in the first panel of the arch, the steel for which had been erected by a floating derrick.

The falsework bents at panel points 1, 2 and 4 were the same ones as used under the south arm. The piers for the bents at panel points 7, 11 and 16 were steel boxes containing steel H-section piles incased in concrete, and in most respects similar to the pier used at bent 7 south. Bent 7 north was made up of Port Richmond approach girders. Bent 11 consisted of the bent used at panel point 4, which was remodeled to fit by utilizing additional floorbeams. The bent at panel point 16 consisted of the bent used at panel point 7 supplemented by additional girders from the Port Richmond approach. It was built with jacks at the top, which were raised when erection reached that point to reduce the load on bent 11. Later, when erection had reached panel point 15 south, the jacks were raised again to release bent 11 entirely.

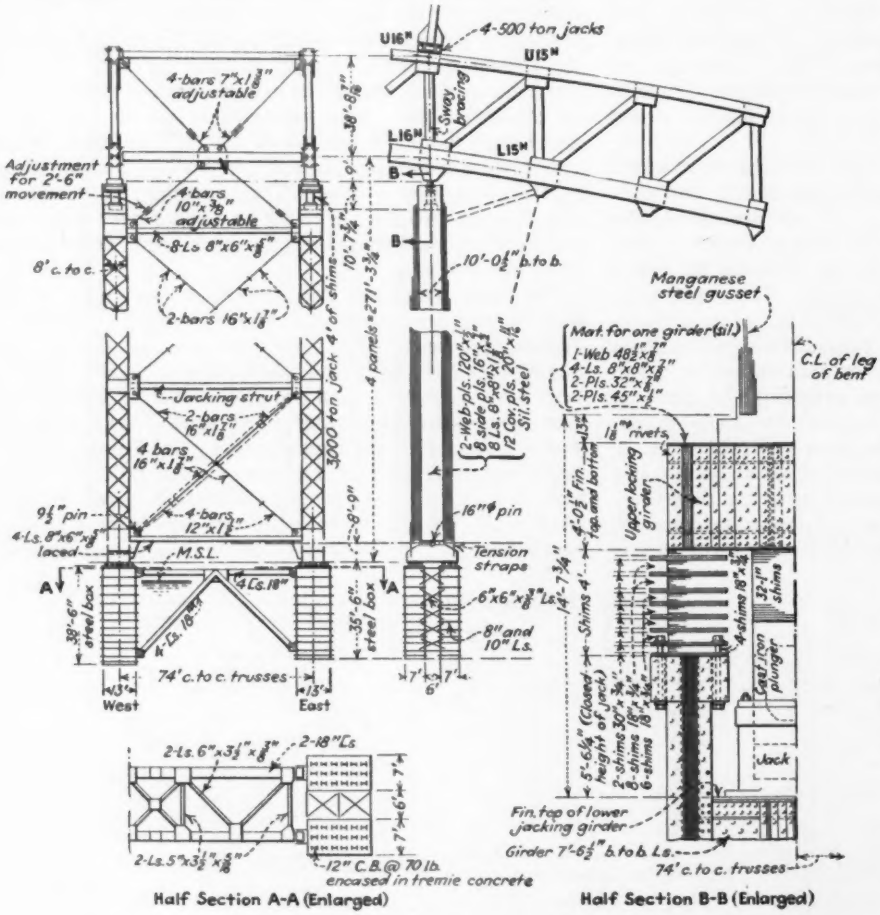


FIG. 4—DETAILS OF FALSEWORK BENT AT PANEL POINT 16
This bent, which supported the long north arm until closure, is similar in general to the other bents. Note jack arrangement in top of bent and the 4-ft. pack of shims, which was removed in lowering the north arm to closure.

After the main arch traveler had advanced beyond panel point 16 north, and while it was erecting the arch out as far as panel point 20, a traveler which, like the main arch traveler, had been erected in the first panel of the arch by the approach traveler, moved out to panel point 16 to erect a temporary toggle truss over this point. This toggle (Figs. 5 and 7) was designed to relieve the stresses in the members adjacent to the falsework support at panel point 16. It was made up of a post over panel point 16 and inclined eyebar members connected to the top chord at panel points 13 and 19 for each truss. Four jacks of 500-ton capacity, placed in the base of each toggle strut, brought the toggle post shoe and the upper chord into contact. After applying various loadings with these jacks, to determine the relationship between stress and required shim

thicknesses, the shoes were shimmed (about 4¾ in. of shim) in a position corresponding to a stress of 360 tons in each toggle post; and erection of the arch continued south from panel point 20.

Stress measurements were made on the toggle at several stages of erection and proved unusually satisfactory. The stresses followed theoretical values closely, and at the time of closure the stress measurements indicated that the tension in the eyebars was within 3 per cent of the calculated value of 3,880,000 lb.

Closure Operations

When erection work reached panel point 15 south, operations bearing on the closure of the arch were begun. The jacks in the top of the bent at panel point 16 north were raised until they were 3½ ft. above zero runout, which required a jacking force of approximately 3,000 tons, after which shims were inserted and the jacks released. Bottom chord L14-L15 was then erected by entering it vertically from below. This was followed by the diagonals and upper chord in this panel and the vertical U14-L14, after which the arch was ready for the closing operation. The view in Fig. 2 shows these members in place.

At the point of closure a 16-in. diameter pin was used as a convenient method of centering the lower chord members as they came together. A clearance of 1 in. between the ends of the chords at the pin was provided to make closure easier. This was the only joint in the lower chord not in full bearing, and it was spliced after closure for the entire compression, except for the small amount of load transmitted directly through the pin. The pin was fastened in a half hole in the end of member L13-L14 on the south arm (Fig. 11), so that the other half hole in the end of member L14-L15 could be lowered onto it. Another detail at the closure point was the use of a temporary arrangement of lateral bracing in the two adjacent panels (Fig. 9), made necessary because

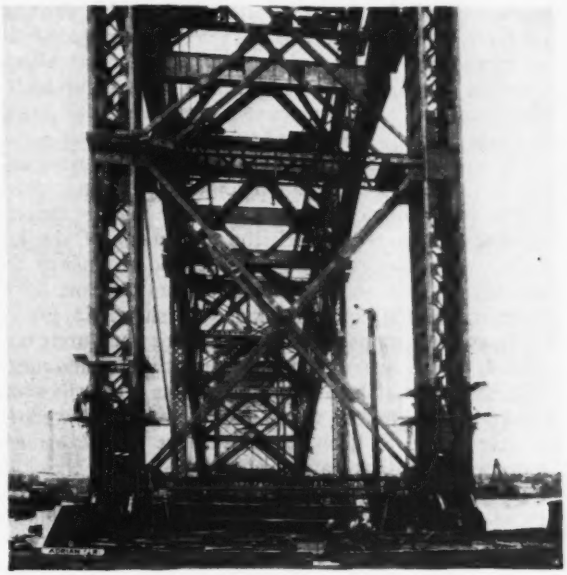


FIG. 6—FALSEWORK BENT 7, SHOWING MASSIVENESS OF MAKE-UP
Note jacks in strut at mid-height for pre-stressing.

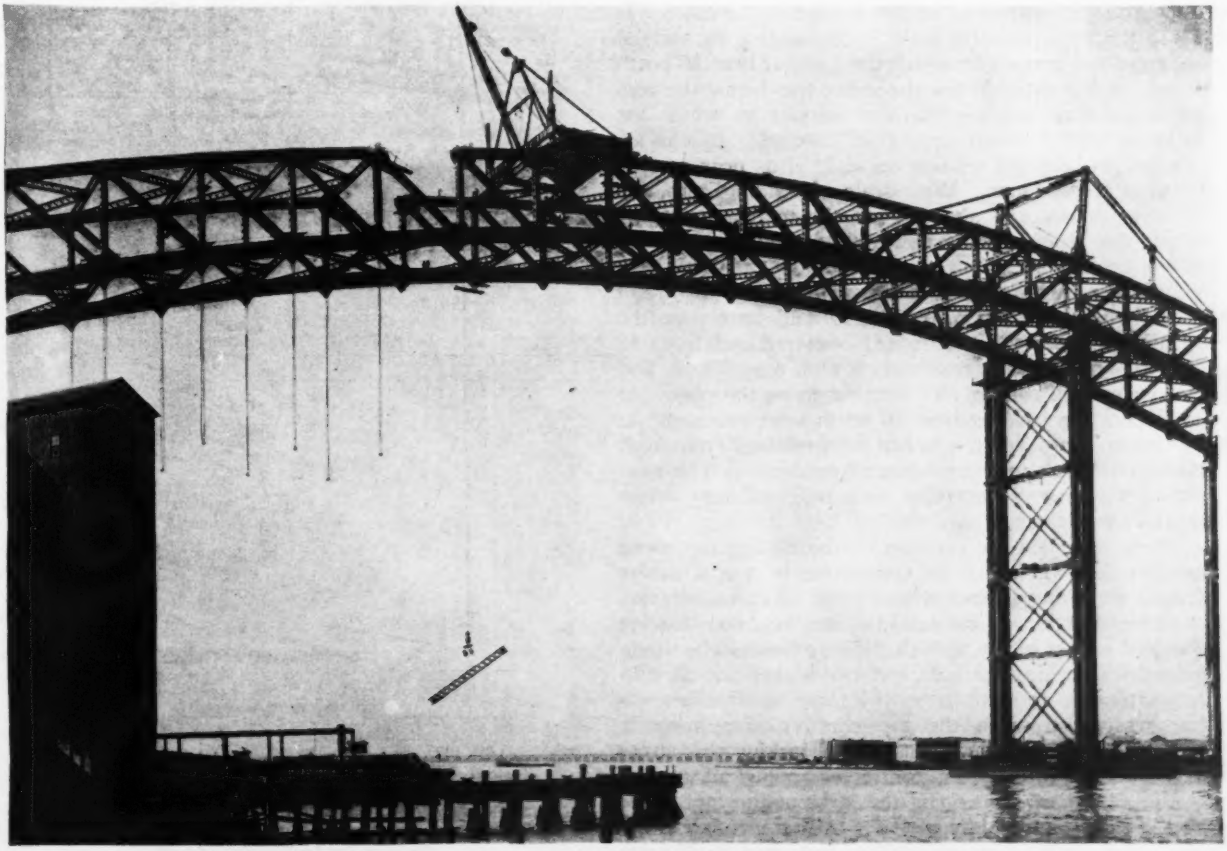


FIG. 7—RAISING LAST BRACING MEMBER BEFORE CLOSURE OPERATIONS WERE BEGUN

the strut at L14 could not be placed until closure had been made and the splice plates attached.

A supplementary mechanism to insure horizontal alignment of the arch trusses was an interlocking device, or guide casting, with a tongue projecting from the north arm to engage a slot on the south arm. The two halves of the guide casting (Fig. 9) were temporarily fastened to the top of the lower chord members by drift pins and bolts. This device was designed to lock just before the north arm was seated on the pin. It was also designed to be effective for errors in alignment up to 6 in. The actual error in alignment was less than 1 in., so that the guide castings functioned perfectly.

When the arch was ready for closure there was an opening at L14 south of approximately 12 in. An ingenious and simple arrangement for taking measurements was devised to check the movement of the arms as they were lowered into contact and to insure their approaching one another along a continuation of the center line of the bottom chord. As shown in Fig. 10, two measuring strips were provided for each arch truss. Scale *A*, whose readings showed directly the amounts by which the jacks at bent 7 south or bent 16 north should be lowered, as well as which jack should be lowered at any given time to keep the movement of the arms on the proper course, was attached to L13-L14 on the milled edge of the chord with the zero point 1 ft. 7½ in. above the center line of the chord. Scale *B*, which indicated the total amount (when the reading on scale *A* was zero) by which the jacks at bent 7 south and bent 16 north must be lowered to close the span, was mounted as shown in Figs. 10 and 11, with its face 1 ft. 7½ in. above and parallel to the center line of the chord.

As the arms were lowered scale *A* was read, using the top face of scale *B* as an index. When this index was above the zero point on scale *A* the reading of scale *A* indicated the amount by which the jacks at bent 16 north should be lowered. When the index was below the zero point the scale reading was the amount by which the jacks at bent 7 south should be lowered. It was attempted to keep the reading on scale *A* as near zero as possible at all times. With scale *A* reading zero, the readings on scale *B* always gave the total amounts by which the jacks must be lowered to make contact between the chords.

Jacking and removal of shims at bents 16 north and 7 south began at 2 p.m. on Oct. 3, and by 6 p.m. the opening between the chords had been reduced from 12 to 7 in. Jacking was resumed on Oct. 4 at 8 a.m., and by 11 a.m. full contact had been made on the pins. At 3:15 p.m. the jacks at bent 16 north were released. At 3:45 p.m. bent 7 south also had been released from load, placing the arch in a three-hinged condition. The closing operation was carefully executed and kept under control at all times.

There remained the erection of the closing top chord member U13-U14 and the conversion of the structure from a three-hinged arch with a hinge at L14 south to a two-hinged arch. In the design it was assumed that for the dead weight of the arch ring the arch would be three-hinged with a hinge at L20, and two-hinged for all subsequent loads. In accordance with these assumptions, the compressive stress in the top chord closing member U13-U14 was computed. Instead of jacking this stress into U13-U14 directly, the contractor applied an upward force at L7 south by raising the jacks at the top of the bent at that point, and inserted the closing member under zero stress. The upward force used was that force

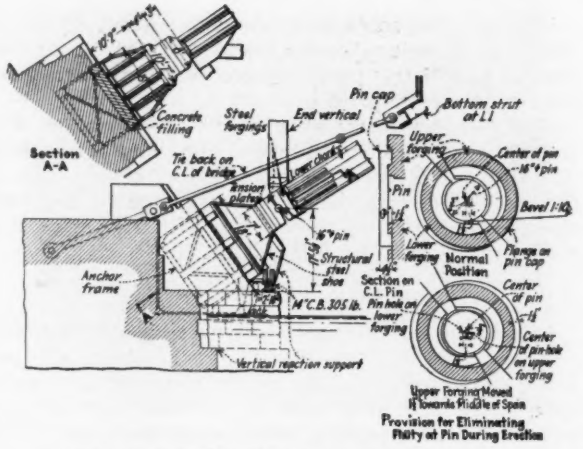


FIG. 8—STEELWORK AT ARCH ABUTMENT
Eyebar tiebacks, tension plates and reaction support are temporary members required for wind and erection loads on the cantilever arm. Note hinge-pin mounting to eliminate fixity at support.

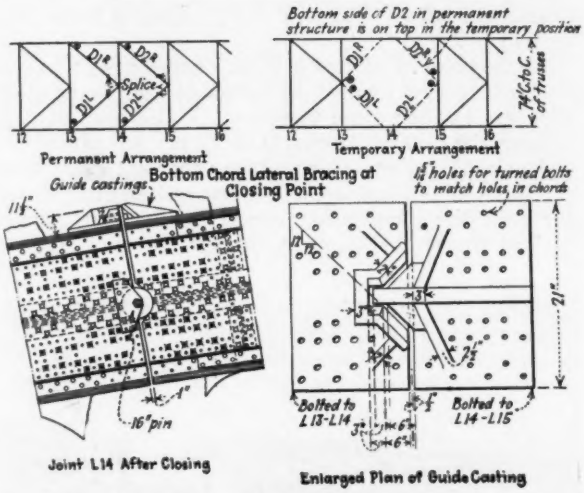

Bottom side of D2 in permanent structure is on top in the temporary position
Splice
Permanent Arrangement
Temporary Arrangement
Guide castings
Bottom Chord Lateral Bracing at Closing Point
holes for turned bolts to match holes in chords
16"pin
Joint L14 After Closing
Bolted to L13-L14
Bolted to L14-L15
Enlarged Plan of Guide Casting

FIG. 9—BOTTOM CHORD CLOSURE DETAILS AT PANEL POINT 14 SOUTH

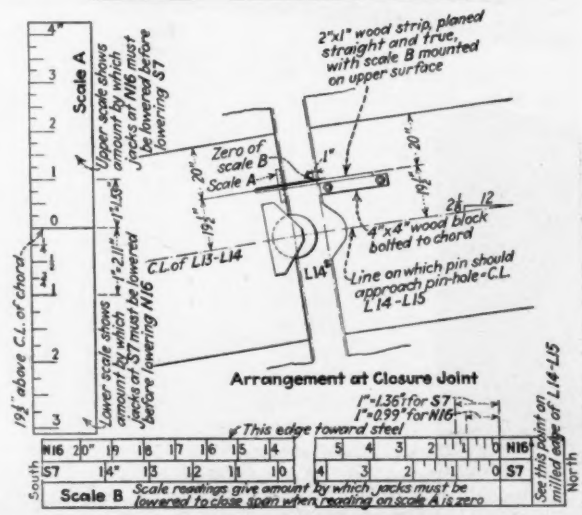

Scale A
Upper scale shows amount by which jacks at N16 must be lowered before lowering S7
Lower scale shows amount by which jacks at S7 must be lowered before lowering N16
2"x1" wood strip, planed straight and true, with scale B mounted on upper surface
Zero of scale B
Scale A
4"x4" wood block bolted to chord
C.L. of L13-L14
Line on which pin should approach pin-hole=C.L. L14-L15
Arrangement at Closure Joint
This edge toward steel
Scale B
Scale readings give amount by which jacks must be lowered to close span when reading on scale A is zero
See this point on milled edge of L14-L15
South
North

FIG. 10—SCALES USED TO GUIDE BOTTOM CHORD CLOSING OPERATIONS
See text for explanation of use.

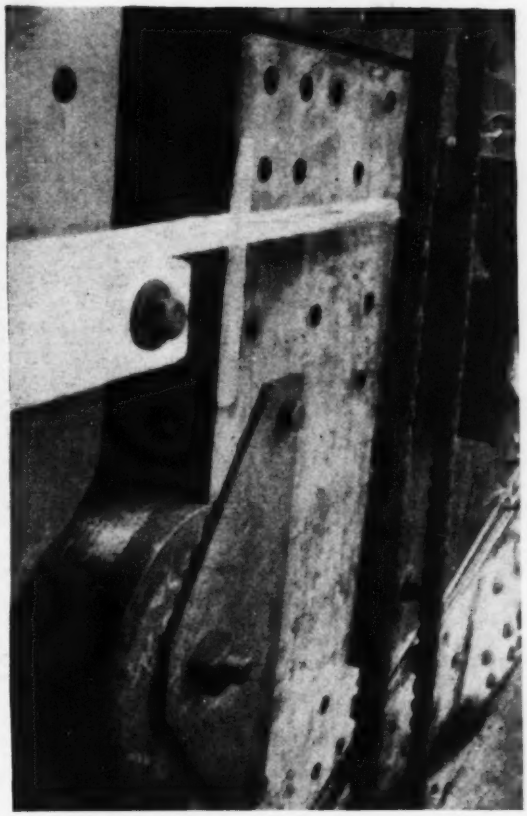


FIG. 11—CLOSURE JOINT AT L14 SOUTH
Horizontal board carries scale *B* illustrated in Fig. 10. Scale *A* may be seen pasted in a vertical position along edge of chord. Telephone, for communication with men at jacks at bents 7S and 16N, may be seen at upper right.

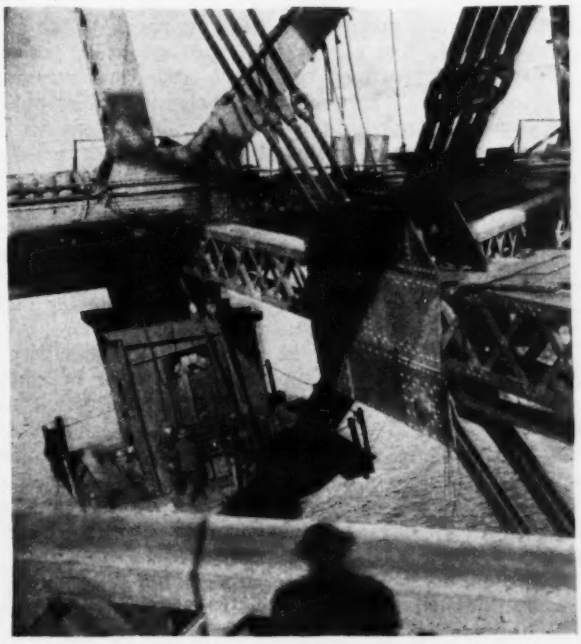


FIG. 12—REMOVING SHIMS AT BENT 16 NORTH DURING CLOSURE OPERATIONS
As arch was lowered diagonals in foreground, connecting falsework with main structure, had to be continually and carefully adjusted.

which, if acting on the completed two-hinged arch, would reduce the stress in the closing member to zero.

The jacks were first raised sufficiently to insert the member U13-U14, after which its connection at U13 was lightly pinned. The jacks were then raised enough to produce the upward force required with temperature taken into consideration, and some of the blank holes at U14 were drilled and pinned. The pins at U13 were then removed, and the jacks were raised still farther to open the joint at U13 about ½ in., so as to prevent any temperature effect on the drilling of the remaining holes at U14. After this joint was completely drilled, pinned and bolted, the jacks were lowered enough to again close the joint at U13, which was thereupon pinned and bolted. The jacks were then released, which completed the operations necessary to place the arch in the condition contemplated in the design.

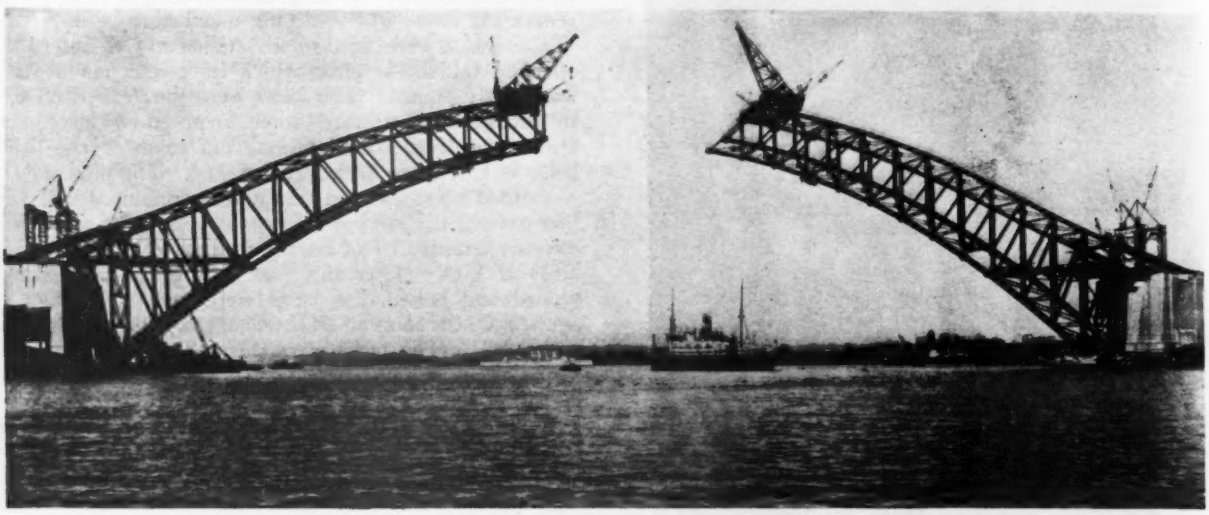
Coincident with the installation of U13-U14, fitting up of the splice at L14 across the pin joint was completed. Sufficient splice plates were provided to splice all the bottom chord material, except those parts which have bearing directly on the pin.

COMPARATIVE DATA ON SYDNEY HARBOR AND KILL VAN KULL ARCHES

	Sydney Harbor	*Kill van Kull*
Type of arch	Two-hinged, Si steel	Two-hinged, carbon-manganese and silicon steel
Weight of steel	37,000 tons	16,000 tons
Clearances	172½′ center; 160′ harbor line	150′ center; 135′ harbor line
Deck	56′ roadway, plus four lines of elec. railways, plus two 10′ sidewalks	40′ roadway plus two 6½′ sidewalks and provision for two rapid transit lines
Truss data	98½″ c. to c.; 28 panels; 60′ deep at crown 187′ 9″ deep at end post	74′ c. to c. 40 panels 37′ 6″ at crown 67′ 6″ at end post
Span	1,650′ c. to c. pins	1,652′ 1″ c. to c. pins 1,675′ c. to c. bearings
Rise	350′ between pins	266′ between pins
Lower chord	48″ deep at crown 1,060 sq.in. at crown 99″ deep at hinges 2,700 sq.in. at hinges 11′ wide over all	82″ deep at crown 580 sq in. at crown 82″ deep at hinges 983.5 sq.in. at hinges 5′ 3½″ wide over all
Upper chord	40″ deep (except end panel) 66″ deep end panel 11″ wide over all	48″ deep over all . . . . . 5′ 3½″ wide over all
Flange angles	12x12x1⅛″	8x8x1
Abutments	224′ wide x 161′ long	133½′ wide x 107½′ long
Hinge pins	14½″ dia. 13′ 8″ long	16″ dia. x 8′ long
Foundation	Solid sandstone	Trap rock or diabase
Thickest plate	2¼″	1½″
Largest rivets	14⅛x1¼″	14x1½″
Arch erection began	January, 1925	November, 1929
Arch closed	August 18, 1930	October 4, 1930

Now that the arch is completed, work will be rapidly prosecuted, placing the wire rope hangers, floorbeams, stringers and bracing of the floor system. In doing this the arch traveler, which stood at panel point 15 during closure, will move south erecting the floor. At the north end a special stiff-leg floor traveler will begin at the end of the approach over the abutment, erecting steel as it is moved along at floor level.

The Kill van Kull bridge was designed by and is being erected under the supervision of the Port of New York Authority, O. H. Ammann chief engineer, Allston Dana engineer of design, M. B. Case engineer of construction, and R. T. Robinson resident engineer. The erection scheme was devised by the contractor, the American Bridge Co., under the direction of C. G. E. Larsson, chief consulting engineer, O. E. Hovey assistant chief engineer, J. E. Wadsworth division engineer, H. W. Troelsch designing engineer, and J. B. Gemberling division manager of erection. D. S. Fine is resident engineer, and Dan McQuarrie foreman for the contractor.



Erecting the Steel-Arch Bridge Over Sydney Harbor in Australia

Erecting the Sydney Harbor Steel-Arch Bridge

Cantilever Erection Without Falsework Utilizing Cable Tiebacks—Closure Pins Transmit All Direct Stresses With Splice Plates for Secondary Stresses Only

THE 1,650-ft. steel-arch bridge across the harbor at Sydney, Australia, was closed at 4:15 p.m. on Aug. 19. The methods by which the closure was effected are of interest in themselves and also by virtue of the comparison they afford with the procedure used in closing the Kill van Kull arch in the upper bay at New York City. The following account of the work is based upon information supplied by Dorman, Long & Co., the contractors; upon articles in *Engineering* (London), April 18 and 25, 1930, supplemented by drawings furnished by J. J. C. Bradfield, chief engineer of the Sydney Harbor Commission; as well as upon articles published in *Engineering News-Record*, April 5, 1928, p. 538, and May 8, 1930, p. 761.

The Sydney harbor bridge was erected by cantilevering the half arches out simultaneously from either shore, without the use of any falsework, the two cantilevers being tied back with cable anchorages. As shown in Fig. 1, the anchorage cables were attached to the top of the end post at one truss, passed over a steel saddle on the rear wall of the abutment, and thence around the anchorage and up to the end post of the opposite truss. Each anchorage consisted of a solid mass of sandstone surrounded by a loop or U-shaped tunnel through which the cables passed, the weight of the sandstone mass resisting the upward pull of the cables. The bearing surface of the tunnel was lined with concrete and faced with corrugated steel sheeting. At the mouths of the tunnels heavy concrete saddles incasing curved pipes were used to provide the necessary change in direction of the cables at these points.

The cables, arranged in eight rows of sixteen each, were attached progressively as the arch cantilevers were built out, all of the 128 being in position by the time the seventh panel was erected. During the early stages of erection, only enough cables were attached to balance the weight of the arch steel and to insure that the load on the two raking struts, auxiliary compression members attached to a bracket on the shore face of each end post as shown in Fig. 1, would not be exceeded. These struts, together with eight cables at each end post (fastened just above the point of attachment of the raking strut), constituted a temporary anchorage, holding the steelwork until the heavy members in the first panel of the arch were erected. The cables were then removed, but the raking struts remained until each arch cantilever was half completed. The temporary anchorage cables pulled the arch steelwork back against the raking strut, whose primary purpose was to allow the cables to be drawn very tight, rendering the structure more rigid under wind and erection loads.

Details of the final anchorage of 128 2¼-in. diameter cables are shown in Fig. 1. The cables were attached to 9-in. pins in special link plates, which in turn were fastened to the top chord by two 27-in. diameter pins, each of which extended halfway through the chord.

In adjusting the anchorage cables during installation, a predetermined load was applied by means of hydraulic jacks, and to check this tension and to insure that the load was equally distributed among the cables, the 133-ft. length of cable between the end posts and the abutment saddles was vibrated, a stress relation for the number of vibrations per minute having been worked out. During the progress of the work the anchorage cables were continuously inspected by vibration measurements.

Erection of the arch was effected by 120-ton electrically operated travelers operating on the top chords. The heaviest lift during erection was the bottom chord of the sixth panel, which was placed in two halves each 6x5½ ft. by 66 ft. long and weighing 110 tons.

Closure was made at panel point 14, there being 28 panels in the completed arch. At the beginning of the

erection work each end post was tilted shoreward 30 in. from the vertical at the top, an amount sufficient to provide an opening of not less than 1 ft. 9 in. at the center joint of the lower chord at maximum temperature and 4 ft. 3 in. at minimum temperature. Details of the lower chord joint at panel point 14 are shown in Fig. 2. Each half of the center joint was fitted with a heavy steel forging inclosing an 8-in. pin, half of the pin-hole being in each forging. Preliminary to closure this pin was secured by set screws to one of the half holes.

As an aid in lateral adjustment, a special locking bolt 10 in. square and 7 ft. $3\frac{3}{4}$ in. long was installed in the center compartment of one chord. This bolt had a tapered end designed to engage a square opening in a diaphragm carried on the end of the other chord member, engagement between the bolt and the diaphragm being assured by a 100-ton jack, which forced the locking bolt forward as the two half arches were lowered by slacking off on the anchorage cables.

An account in the Sydney *Morning Herald*, Sept. 11, 1930, written by Ralph Freeman, consulting engineer of Dorman, Long & Co., Ltd., the contractor, gave some facts regarding the closure of the arch. The operation of lowering the two half arches onto the 8-in. diameter pins consumed ten days. The closure was unexpectedly difficult because of extreme variations in temperature, and much of the work was done at night. When the half arches were just near enough to bring the locking bolt into action, a warm day occurred, causing the steel to expand and bringing the arms within $\frac{1}{2}$ in. of touching out of line. By special exertion, however, the locking bolt was forced into its socket and correct alignment maintained. The evening continued warm, so that contraction was not excessive, and by 10 p.m. on the night of Aug. 18, lowering exceeded the effect of cooling, and the arms met on the closure pin. Complete closure was effected the following afternoon. The tension in the anchorage cables had to be reduced slowly, and it was not until Sept. 8 that the cables were finally removed.

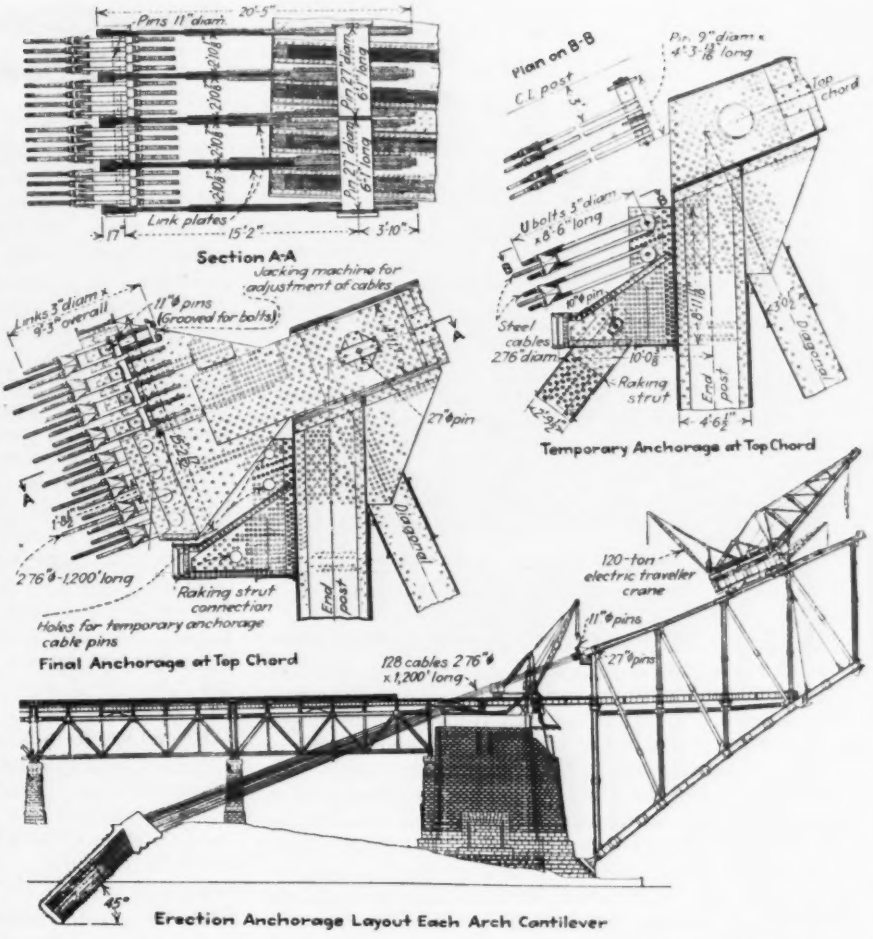


FIG. 1—ANCHORAGE DETAILS, SYDNEY HARBOR ARCH BRIDGE

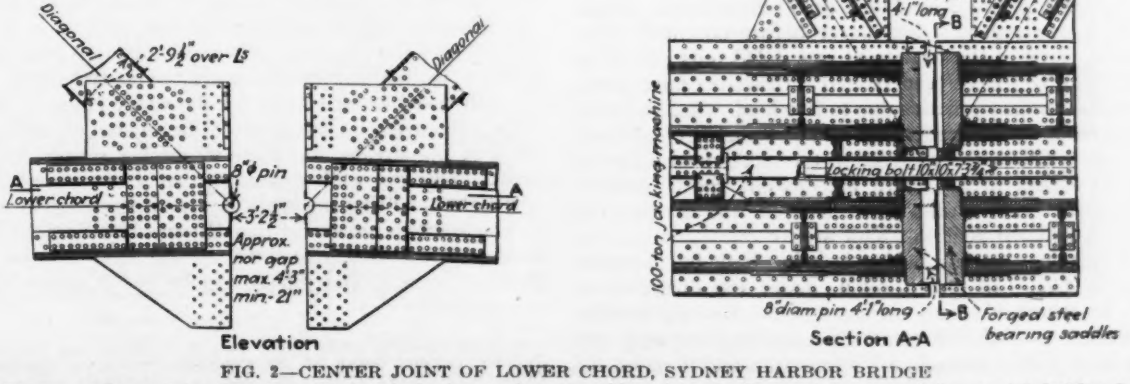


FIG. 2—CENTER JOINT OF LOWER CHORD, SYDNEY HARBOR BRIDGE

Closure made on 8-in. diameter pins by slackening anchorage cables; lateral alignment is assured by special locking bolt arrangement

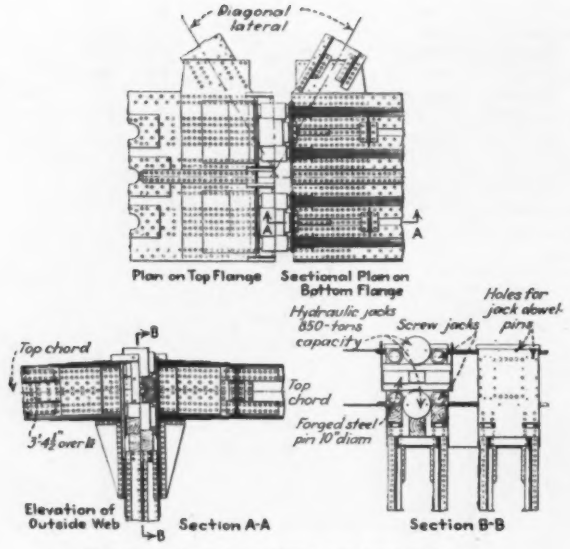


FIG. 3—CENTER JOINT OF TOP CHORD

Top chords closed on 10-in. diameter pins. Compression in top chord, necessary to change arch from three-hinged to two-hinged, provided by four 850-ton hydraulic jacks installed in top chord

With the bottom chord closed, the remaining web and top chord members in the panels either side of the center were erected. Changing the arch from its three-hinged condition to a two-hinged arch necessitated placing a predetermined stress in the top chord at the center. The last two top chord sections to be erected were designed to permit a gap between their end plates of 2 ft. 1 in. for the insertion of 1,000-ton hydraulic jacks, two in each outer compartment of the chords. Details of the top chord at point of closure are shown in Fig. 3. Closure was made on a 10-in. diameter pin held in position by forgings similar to those used in the bottom chord. In placing the necessary compression in the top chords, the hydraulic jacks were operated to force the chords apart an additional 5 in., the movement of the jacks being taken up by auxiliary screw-jacks. The opening formed between the end plates of the chords was then closed with filler plates machined to thickness, and the jacks were released, placing the arch in a true two-hinged condition with pin joints at the center of both top and bottom chords.

In writing of the top chord closure in the *Morning Herald* account quoted above, Mr. Freeman characterized it as the most important operation in the erection program. By coincidence, the top chord was ready for the final jacking on a day (Sept. 8) when the temperature, as measured by 24 thermometers on different parts of the bridge, was within 1 or 2 deg. of 60 deg. F.—an almost perfect condition that had never before obtained. The jacking force in the top chord was 3,248 tons per truss.

Splice plates have been riveted across the center joints to take secondary stresses due to live load, wind and temperature, but all direct stresses will be transferred through the pins. (Note the contrast to the method used on the Kill van Kull arch, where the bottom chord joint is spliced for nearly full value. No pin was used in the top chord of the Kill van Kull arch.)

The Sydney harbor bridge is being built by Dorman, Long & Co., Ltd., of London, under the direction of J. J. C. Bradfield, chief engineer of the Sydney Harbor Commission. Ralph Freeman is consulting engineer and Lawrence Ennis manager of fabrication and erection on the job for the contractor.

From a Colorado Irrigation Engineer in Soviet Central Asia

By Lyman E. Bishop

Consulting Engineer for Sredazvodhoz, Tashkent, U.S.S.R.

FOR THE past month we have been on the five-day week plan. We work four days at the office (9 till 4) and then the fifth day is off—rest day.

I have a very comfortable four-room apartment that is furnished me by Sredazvodhoz for living quarters. I have four rooms—bedroom, study (living room), dining room and kitchen. Then I have a nice bathroom and a maid's room and veranda. Verandas are quite the thing in central Asia. Your veranda is at the back of your house, your back porch, and you eat your meals there from April to October.

Sredazvodhoz is the Soviet government irrigation bureau for central Asia. They have about 800 employees, officials, engineers, assistants, clerks, etc. They are like our federal reclamation bureau. They have their own two-story building here in Tashkent, a very fine modern building. I've got a stenographer now—a Russian woman who talks pretty good English. She can make fair translations. She knows no shorthand, but she can take dictation—mine, too—on the machine, about half as fast as I would like to talk.

From Oct. 10 to Nov. 3 I was on a field trip inspecting irrigation conditions and systems in the Ferghana Valley (about 200 miles from Tashkent). This valley is egg-shaped, about 60 miles wide by 140 miles long. There are now some 1,900,000 acres under irrigation and cultivation in this valley. Roughly, two-thirds of the area is devoted to cotton. The other crops are rice, wheat, corn, fruits, etc. Silk raising (cocoons) is also quite important in this valley. Some of this land has been under irrigation and cultivation for over 1,200 years. I traveled about 2,000 miles on my inspection trip all by auto truck. I slept in a new place most every night. (I had my own bedding and camp cot with me.) Most of the time I had two interpreters with me—besides my Russian engineers, generally two of them. The two interpreters are English-Russian and Russian-Uzbeck. Most of the local water officials are Uzbecks and it's a long ways before I can understand them—it's via two interpreters.

There are some pretty fair-sized towns in this Ferghana Valley. There's Andigan, 80,000; Kokand, 100,000; Namagan, 35,000; Terghana, 30,000. Two principal rivers furnish water. The largest one has a yearly average flow of 17,000 sec.-ft., with the average flow during the growing season of about 26,000 sec.-ft. The absolute daily maximum of this stream is 85,500 sec.-ft., and the absolute daily minimum is 3,800 sec.-ft. Besides two main rivers there are twelve tributaries that are sources of water supply for the valley lands. One of these tributaries I visited has 92 headgates on an 8-mile reach of the stream, and these 92 ditches supply 337,000 acres. You can well appreciate that I am seeing many new sights and that my work is very interesting to me.

You want to remember that Russia—the Soviet Union now—covers about one-sixth of the land area of the globe. The next time you see a globe look it over. You'll be surprised.

Excerpts from a letter dated Dec. 5, 1929, in *The Engineer's Bulletin* (official organ of the Colorado Society of Engineers), January-February, 1930. Mr. Bishop's American office is at Denver, Colo.

Oil Burner Used in Recarbonation of Lime-Softened Water

Three Quarts of Oil Per Hour Furnish Ample CO_2 Which Is Scrubbed and Compressed Before Applying to Water

By James A. Worsham
Williams Oil-O-Matic Heating Corp., Bloomington, Ill.

CARBON DIOXIDE, for use in recarbonating the lime-softened water of Bloomington, Ill., is produced by the combustion of fuel oil in a commercial oil burner. The burner is installed in a low-pressure steam boiler and supplies heat for the offices in winter and for hot water in summer. The flue gases are diluted with air, scrubbed and compressed before being applied to the water being treated.

Until March, 1930, Bloomington had depended upon deep wells for its water supply, but the steady growth of the city and the gradual lowering of the natural water table made it imperative that a new source of supply be provided. An impounding reservoir and dam on Money Creek were constructed. Bloomington's population of 35,000 is now using about 2 m.g.d., and the new reservoir can provide water for a population three times as great.

The new supply, although somewhat softer than the water obtained from the wells, contains about 250 p.p.m. of hardness, so that the construction of a softening plant was necessary in order to make the water suitable for household and industrial use. The plant makes use of the excess-lime treatment process, followed by recarbonation to prevent precipitation of the calcium carbonate held in supersaturated condition.

The carbon dioxide used in the recarbonation treatment is prepared in the plant, shown in Fig. 1. The equipment consists of a fuel-oil burner, a scrubber-cooler tank in which the gases of combustion pass upward through a bed of coke sprayed with water, a compressor which serves both to create a draft in the burner and to force the carbon dioxide to its point of application, and a drier for removing moisture and preventing the corrosion of the discharge line and distributing grid.

When the installation was first made a brick combustion chamber only was used instead of the steam boiler now in use. The oil burner in that installation was larger than the present one and used 3 gal. of oil per hour. It was found, however, that the excessive heat generated, all of which went to waste, caused rapid

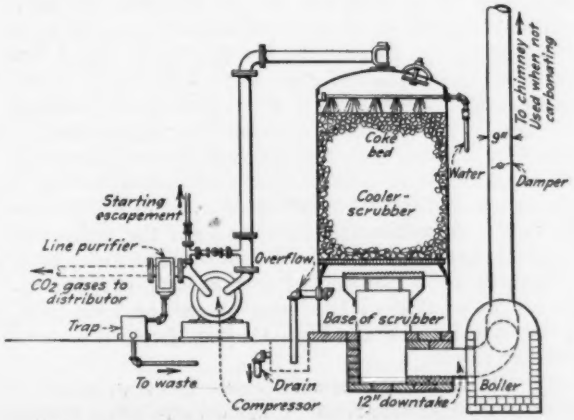


FIG. 1—CARBON DIOXIDE GENERATING PLANT

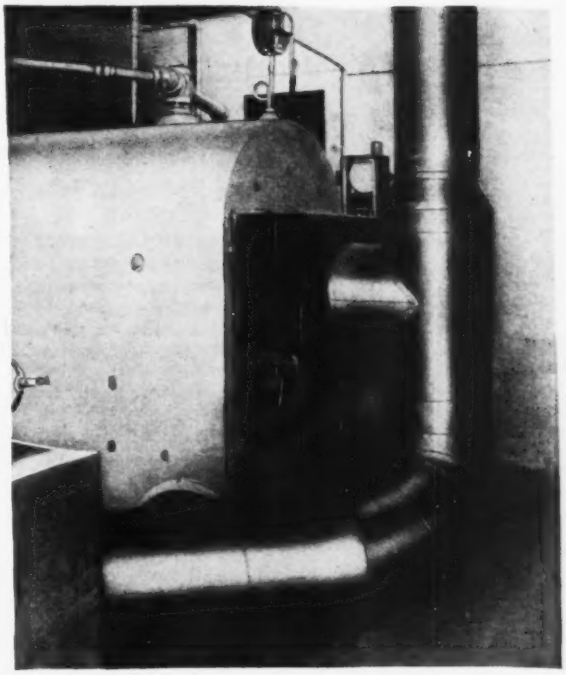


FIG. 2—REAR VIEW OF BOILER

deterioration of the walls of the chamber. Cracks and air leaks were formed, which interfered with perfect combustion. Another bad result of the high temperature was the tendency to burn off or injure the nozzle of the oil burner. Besides, there was much more carbon dioxide produced than was necessary for recarbonation.

These experiences prompted the removal of the brick fire chamber and the installation of a regular low-pressure steam boiler. A smaller oil burner was installed, having a maximum capacity of 3 gal. of oil per hour. After repeated tests, it has been found that only 3 qt. per hour is necessary at present to furnish ample carbon dioxide. The economy of the new arrangement lies in the ability to use the steam for office-heating purposes in winter and for automatic heating of water in summer.

In the present installation operation is automatic. If the water in the boiler gets low, if ignition fails, or if the oil supply is exhausted, the burner is automatically shut down. If the steam line becomes plugged up, automatic control shuts the burner down at 4-lb. pressure.

At the rear of the boiler a 12-in. pipe leads from the base of the draft pipe to the base of the scrubber. A 9-in. draft stack leads up and over to a chimney of the regular heating plant. In it there is an automatic damper that remains closed while the carbon dioxide is being forced through the water supply, but opens automatically when recarbonation is not in progress and allows all the products of combustion to pass out the chimney. On the draft stack, leading to the chimney, there is an additional damper which adjusts the draft for variations in temperature and wind.

In the 12-in. downtake leading to the base of the scrubber there is a damper which admits the desired amount of air to be mixed with the products of combustion. The reason for this dilution is that there is a concentration of approximately 15 per cent by volume of carbon dioxide in the flue gases, while a concentration of only 4 per cent is necessary in the recarbonation process. A carbon dioxide recorder is connected by a pipe to the downtake at the base of the scrubber.

Concrete and Cement-Macadam Roads in Europe

Reports on Foreign Practice to International Road Congress Reveal a Trend From Special Concretes to Standard Mixtures—Prevalence of Steel-Tired Traffic Keeps Two-Course Construction in Favor—Cement-Bound Macadam Is Being Rapidly Developed for Light Traffic

THIRTEEN countries reported on concrete roads at the International Road Congress held in Washington two weeks ago. In this article extracts are given of portions of these reports having special interest to American road builders because of novelty of practice or thinking. In general, the reports indicate that concrete roads are growing in favor in Europe, but that economic conditions and differences in traffic raise questions of their general serviceability that are not pressing in this country. They indicate, too, that the leading road-building countries abroad are alert in undertaking study that will adjust the concrete road to their conditions and secure the advantages of its recognized merit as a road type. —EDITOR.

CONCRETE-SLAB pavements in Europe are commonly constructed of normal portland cement mixtures, but there has been a wide development of special concretes and of cements with admixtures designed to give the concrete special qualities. In this article only normal concrete construction is considered.

Germany Favors Two-Course Construction—In Germany a two-course construction is employed generally for new roads and commonly for resurfacing old roads. The base course is 1:7 concrete of the consistency of moist earth and the top course is 1:4 concrete, mixed somewhat wetter to a workable consistency. The proportioning is generally by volume; water is carefully regulated, but slump tests are little used. When reinforcement (rare and economic reasons) is used, a mesh is employed and is placed between the base and top courses. A thickened-edge section is usual, the thickening being about 40 per cent of the center thickness and extending in from the edges about 60 cm. (24 in.). The usual center thickness is 20 cm. (7.87 in.) of which about three-fourths to two-thirds is in the base course. For resurfacing, the slab thickness is 7 to 15 cm. (2.75 to 5.9 in.). In new construction the top course is placed directly on the fresh base course; for resurfacing, the old road is brought to true profile with lean concrete, which is then covered with paper or a thin coating of earth on which the resurfacing slab is concreted.

Belgium Lays Alternate Slabs—In Belgium, a slab section 6 m. (19.68 ft.) wide, 12½ cm. (4.92 in.) thick at the edges and 20 cm. (7.87 in.) thick at the center is constructed on a plane subgrade. It is built in alternate 5-m. (16.4-ft.) sections, the second series of sections not being concreted until the first is eight days old. Each section is a continuous pour; it is concreted in two courses, each tamped with a pneumatic tamper. Joints are coated with cold creosote or "carbolineum" and then given a 5-mm. coating of hot, fairly stiff bitumen. Very careful study is given to strength control by cube and cylinder core tests and tests of molded cores and cylinders.

France Emphasizes Power Tamping—In French practice great care is now being taken to obtain a hard and dense concrete. Hand tamping is being replaced by pneumatic tamping, using several types of machines; these include the ordinary pneumatic tamper, the vibrating tamper, and the pneumatic beater, Fig. 1, the speed tamper, Fig. 2, and the vibrating plate.

The pneumatic tamper is used particularly for compacting the top course of pavements constructed of high-early-strength cement and an aggregate grading from 15 to 50 mm. (0.6 to 1.96 in.). The vibrating tamper gives the best results with concretes having an aggregate grading of 13 to 30 mm. (0.5 to 1.18 in.)

On top-course work it is followed by a pneumatic beater which gives the preliminary finish prior to brooming. It is a vibrator mounted on an iron plate on a wood plate and having an inclined handle. The speed tamper is clearly shown by Fig. 2; it weighs 80 kg. (176 lb.) and is operated by two men pressing heavily on the handle bars. The vibrating plate consists of a 0.5x0.25-m. base (1.64x0.82 ft.) attached to the shank of and driven by a pneumatic drill. It weighs 38 kg. (84 lb.) and is operated by one man; it is used chiefly for fine-aggregate concrete.

England Finds Joint Construction Unsatisfactory—Attempts have been made in England to afford support to the edge of one slab by the adjoining slab in many different ways. In some cases a strip of reinforcement has been laid across the joint, embedded half in each slab; this almost entirely prevents free expansion and contraction of the slabs. In other cases a concrete beam or rest, say 18 in. wide and 6 to 9 in. deep, has been constructed across the road on which the two slab ends are supported; to prevent the tilting of this rest it has sometimes been attached rigidly to one slab. Also, bitumen-coated 34-in. dowel rods have been inserted across the joint every 9 in.; provision for expansion and contraction is made either by pulling the rods forward ¾ in. when one slab only has been laid, thus leaving a cavity at one end, or by inserting one end in a bitumen-filled tube. A mechanical lock between the slab ends themselves has been tried, either a tongue-and-groove arrangement or a number of interlocking projections. None of these devices has been altogether successful. The interlocking joint (Fig. 3) has given the most promising results.

FIG. 1—TAMPING ROAD CONCRETE IN FRANCE
At left, pneumatic beater for finishing concrete before brooming. At right, heavy pneumatic tamper.

Italy Builds Experimental Road—In developing a practice in concrete-road construction the Italian

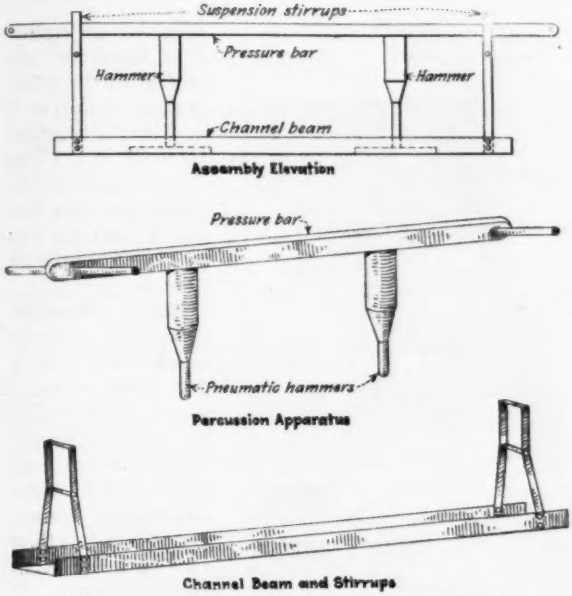


FIG. 2—FRENCH PNEUMATIC TAMPER FOR FINISHING CONCRETE

road department has constructed an experimental road near Binasco (Fig. 7). The questions for investigation are: (1) constructing the pavement half at a time, the other half being used by traffic; (2) concreting alternate sections between side forms of steel, connected across by tierods concreted in, and end forms of planks; (3) central-plant mixing and hauling wet concrete (instead of dry materials) by small cars on rails on the sidewalks; (4) proportioning by weight and exact water determinations; (5) using two coarse-aggregate sizes separately weighed to obtain uniform gradation; (6) comparing different aggregates, as granite, limestone, porphyry, basalt and gravel, to determine reliable materials for use; (7) comparing five kinds of cement, all high-early-strength brands; (8) comparing various proportions of cement—670, 840 and 1,010 lb. per cubic yard; (9) comparing varying degrees of workability; (10) comparing various placing, screeding and finishing procedures; (11) comparing single-course with two-course (lean base and rich top) construction; (12) comparing pavement thicknesses.

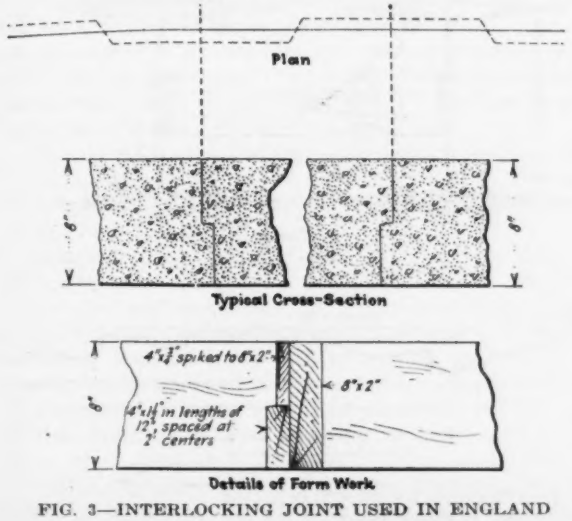


FIG. 3—INTERLOCKING JOINT USED IN ENGLAND

Altogether, 102 different combinations in sections 4½ m. long and 3½ m. wide are included in the experimental road. Besides the determinations during construction, the roughness was determined by the device indicated by Fig. 4, and an accelerated wear test with steel-tired vehicles has been made. Traffic-wear tests and other studies will continue.

Holland Favors One-Course Construction—In Holland, the national roads are two-course concrete, but the reports favors one-course construction.

> A two-course concrete road is not so good, because the unequal distribution of the cement in cross-section causes unequal volume changes in the two courses, and consequently danger of cracking occurs; also, the permeability of the two courses is different. Furthermore, during the hardening of the concrete, calcium hydrate is formed on the plane of contact between the upper and lower courses, which affects the bond between them, so that the resistance to internal stresses due to temperature changes and other weathering influences is lessened. Upper and lower courses, with their varying composition, density and strength, do not produce a continuous whole or monolith, and the plane of contact remains a weak point in the cross-section. In the repair of concrete roads it has often been observed that the surface course is very easily detached from the lower course. It should be remarked, however, that Engineer J. F. Groote, who constructed successfully some concrete roads in Hilversum, found no objection to the two-course method if the upper and lower courses were laid in close succession, one upon the other. Another disadvantage of the two-course system is that the construction of two kinds of concrete demands more work and higher cost than that of a single course. It therefore appears doubtful if the preparation of a lower course of leaner concrete leads in fact to a saving in cost.

Sweden Builds Key Sections—The temperature variation in southern Sweden being from +30 deg. to —20 deg. C., it is only when roads are built early in spring or late in fall that there is any need of expansion joints. To provide for contraction on recent road work, the slab was constructed in sections 31½ m. (103 ft.) long, separated by ½-m. (1.64-ft.) gaps, which were concreted three weeks later. Before filling the gaps the ends of the long slabs were painted with asphalt. Asphalt-painted dowels spaced 0.7 m. (2.3 ft.) and 1.2 m. (3.93 ft.) spanned the ½-m. gaps, as shown by Fig. 5.

Switzerland Experiences Joint Difficulties—Various forms of joint (Fig. 6) are used in Switzerland. In the Prattein road, joints which were originally 0.8 cm. (0.3 in.) wide, show considerable breakage at the corners after three years in service. This road has a daily traffic of 3,400 tons, 3 per cent of which is steel-tired. In the Schinznach Bad-Brugg section, the joints in the top course were formed with a plow-like knife. The result was a displacement of the concrete and the formation of ridges along the joints, which are objectionable to traffic and which have also caused an increase in maintenance costs. This road has a daily traffic of 850 tons, 3 per cent of which is steel-tired.

The Use of Special Concretes

Considerable mileages of pavement have been constructed in continental Europe, with special cement concretes or with concretes with special aggregate wearing surface. Most of these constructions have been directed to securing road surfaces offering increased resistance to wear by steel-tired vehicles.

German Report Defines Special Concretes—Three special concretes have been used in Germany:

1. Solidit Concrete—The distinguishing characteristic of Solidit concrete is the use of a cement to which ground rock high in silica content has been added. It is also considered important to select aggregates

containing a considerable percentage of silica (granite, diorite, etc.) Experience with this particular method has been good. Its good qualities are also traceable to the care exercised during construction.

2. Thurvia Concrete—Like Soliditit concrete, Thurvia concrete is made of a cement compound high in silica, called Thurament, which is principally obtained from basic, water-granulated, blast-furnace slag. In addition, it is desirable to use an aggregate in the wearing course which contains Mansfelder copper slag graded between 0 and 15 mm., the object being the elimination of surface cracking and the attainment of good traction properties. Following some initial failures, this process now appears to be gaining favor.

3. Rhoubenite Concrete—The distinguishing characteristic of Rhoubenite concrete is the addition of a patented powder (Houban powder) of secret composition, which appears to be sawdust treated with tar and small quantities of refined bitumen. In Germany the use of Rhoubenite concrete has been limited. Results from its use have not been satisfactory.

Belgian Experience Generally Satisfactory—In the early Belgian concrete roads Rhoubenite and Soliditit concretes alone were employed. A few years ago, however, the patentees of the Rhoubenite process abandoned the use of Houban powder; the Soliditit process is distinguished from other methods of concrete-road construction only by the use of Soliditit cement. So it has come about that standard mixes have increased in use. Success has been had generally with the special concretes, but recent work with standard concrete is giving equally good results.

Pseudo-Concrete or Cement Macadam

Most European countries, including England, report interest in the use of cement-bound macadam. This construction is an effort to secure a surfacing approaching the stability of concrete without its high cost. The three processes of construction are described and appraised in the report by R. Boutteville, Paris, France.

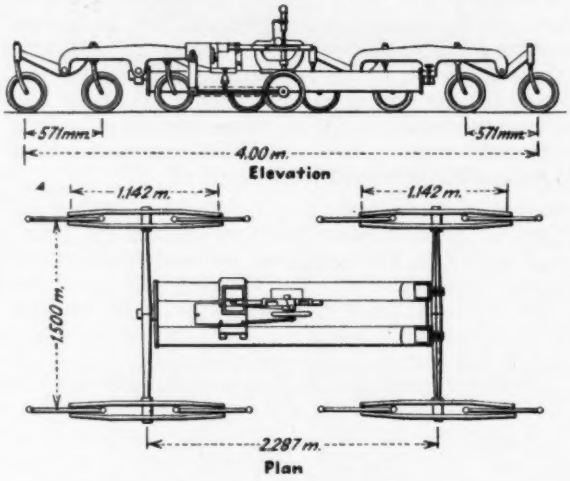
Cement Macadam in France—Cement macadam is a macadam in which the binding material is a mixture of sand and cement. The quantity of cement is less than 100 kg. per cubic meter. Cement macadam may be considered as essentially an extra lean concrete, and its resistance to wear is poor. Therefore, it is necessary to give it protection by means of a bituminous surface treatment. The cement, however, imparts to this type of roadway, in comparison with ordinary macadam, the double advantage of almost complete impermeability and an appreciable increase in cohesion at only a slightly additional expense. For that reason this method has had numerous applications during the last few years.

The nature, the size, and the quantity of the stone materials used are the same as for ordinary remetalling. Hard materials (porphyry, basalts, quartzites, etc.) are employed which do not break under the pressure of the roller or of traffic. The materials are broken to the usual grading, 4 to 6 or 4 to 7 cm. (roughly, 1½ to 2¾ in.). The cement used is generally portland, but slag cement has also been used with success.

FIG. 5—KEY SECTION, SWEDEN

Binder Applied Dry—The stone is rolled once and a dry mixture composed of 500 to 700 kg. of cement per cubic meter of screened sand (maximum dimension, 5 mm.) is then spread by hand over the stones. It is then wetted and rolled again. The mortar, which is worked into shape by the rolling and by sweeping from the edges toward the center of the road, penetrates the interstices between the stones. Care must be taken to avoid excess wetting, which would dilute the mortar, carrying the cement toward the sides of the road; as well as an insufficient moistening of the mortar, which would then refuse to penetrate into the road. The amount of cement used is approximately 90 kg. per cubic meter of materials, covering 12 sq.m. of road, or 7.5 kg. per square meter.

Plastic Binder—Where the cement is applied in the form of a plastic mortar, it is spread evenly over the first



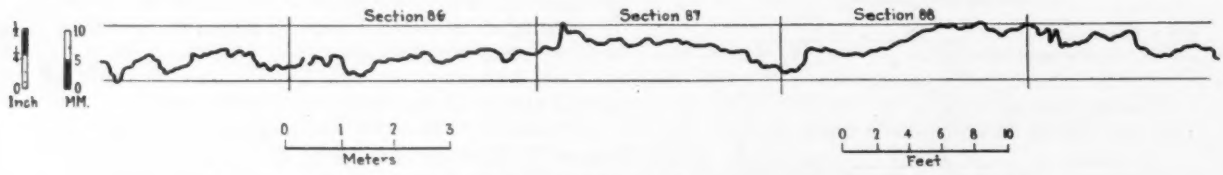


FIG. 4—ITALIAN TEST ROAD MEASURED FOR SMOOTHNESS BY PROFILOGRAPH
Specimen record obtained with the instrument is shown below.

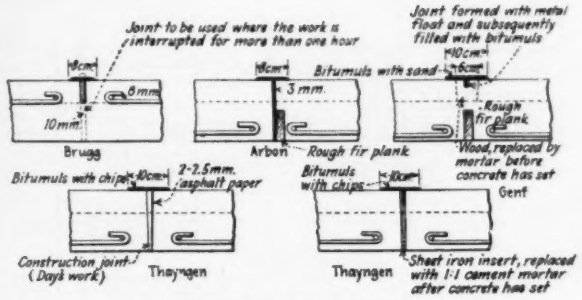

Joint to be used where the work is interrupted for more than one hour
Joint formed with metal float and subsequently filled with bitumuls
Bitumuls with sand
Rough fir plank
Wood, replaced by mortar before concrete has set
Brugg
Arbon
Gent
Bitumuls with chips
2-2.5mm. asphalt paper
Construction joint (Day's work)
Thayngen
Sheet iron insert, replaced with 1:1 cement mortar after concrete has set

FIG. 6—TRANSVERSE JOINT DESIGNS USED IN SWITZERLAND

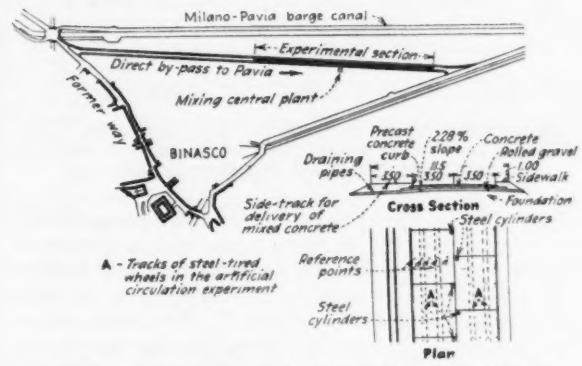


FIG. 7—PLAN AND CROSS-SECTION OF ITALIAN EXPERIMENTAL ROAD

course of stone, another course is placed over it and the whole is then rolled. The mortar should flow to the surface of the pavement, completely coating the stones. This relatively slow and rather difficult process is considerably more costly than the first.

Grout Binder—A thin grout of 700 to 800 kg. of cement per cubic meter of sand is spread with brooms over the macadam after consolidation. The compression is finished without wetting until the mortar appears on the surface, and then care is taken to prevent the mortar from flowing in excess over the surface and solidifying in the form of laitance. The amount of cement used by this process is somewhat greater than by spreading it dry.

Of the three processes which have just been described, the second makes it necessary to close the road to traffic, or at least to work on half the road at a time. The other two methods can, if necessary, be accommodated to the maintenance of traffic, and good results have sometimes been obtained under these conditions.

The second method which is the oldest, produces the best quality of road. It has ceased to be used, however, because of its high cost and the care and skill required in its execution.

Belgium Finds Lack of Durability—Experience in Belgium shows that mortar macadam, though inexpensive in first cost, does not form a durable pavement. Inevitably, it becomes necessary to surface-treat it by means of tar or bitumen at the end of one or two years. It requires minute inspection in the course of construction; all impurities entering the pavement during rolling and all places that lack mortar constitute so many weak points from which destruction may result. Repairs are difficult to make. By reason of all these disadvantages the construction of mortar-macadam surfaces has been largely abandoned.

"Secondary Brittleness" of Steel May Explain Rail Defects

EXTENSIVE studies on rail steel just reported by J. R. Freeman, Jr., and G. W. Quick before the American Institute of Mining and Metallurgical Engineers show that some steels are subject to a peculiar lowering of ductility, or brittleness, at temperatures between 500 and 700 deg. C., and suggest that this phenomenon may help to explain the formation of flaws and shatter cracks in rails, which defects in turn are

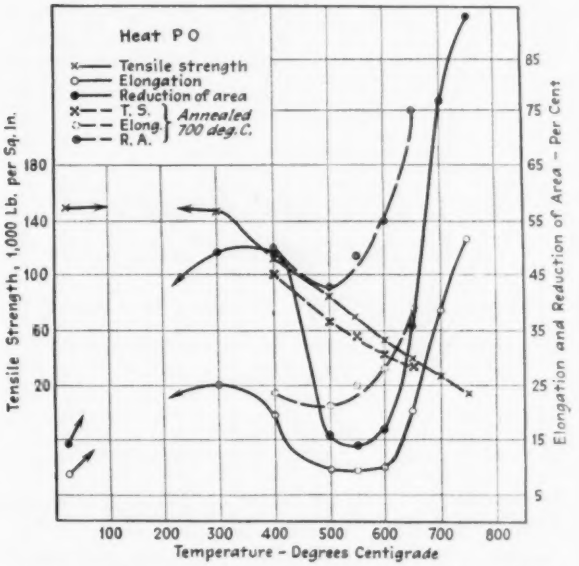


FIG. 1—TENSILE PROPERTIES OF STEEL FROM TRANSVERSE-FISSURED RAIL

Tests after annealing showed improvement in the condition of "secondary brittleness," evidenced by the drop in the ductility curves between 450 and 650 deg. C.

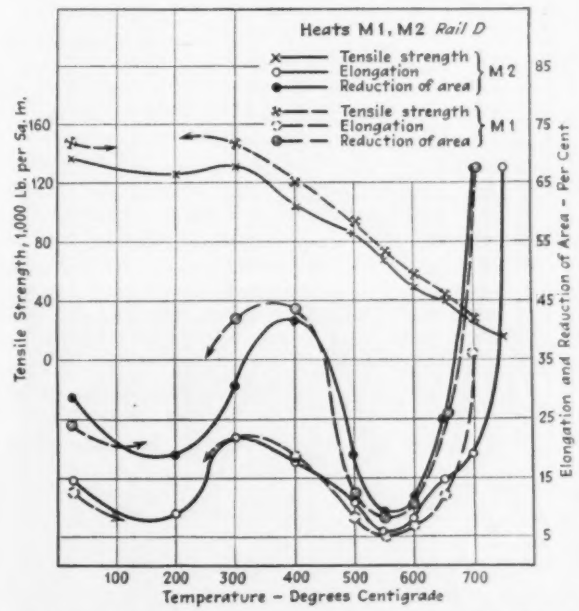


FIG. 2—MARKED SECONDARY BRITTLENESS FOUND IN MEDIUM-MANGANESE RAIL

Both specimens, M_1 with 1.5 per cent and M_2 with 1.2 per cent manganese, show marked secondary brittleness with elongation and slightly above 5 per cent at 550 deg. C.

believed to be related to the transverse-fissure type of rail failure. The studies, carried on at the U. S. Bureau of Standards during the past three years, included tensile tests at elevated temperatures on specimens from failed rails and both new and used rails with no indication of failure; also on high-carbon bar steel, Armco iron and some alloy steels. Many of the specimens showed a sharp drop in elongation and reduction of area in the temperature zone from 500 to 700 deg. C., at which temperatures the tensile strength was 20 to 40 per cent lower than at normal temperature. This drop in ductility was found to be distinct from blue-heat brittleness, which occurs at 200 to 300 deg. C. and is reflected in a similar but smaller decrease in ductility. Annealing decreased the brittleness. The most marked secondary brittleness was found in medium-manganese rails (Mn 1.2 to 1.5 per cent), in which the elongation at 550 deg. C. was 6 to 8 per cent.

Effect of Increased Wages Upon Unit Building Costs

Graphs Indicate That Advance in Cost of Finished Product Is in Proportion to Wage Boosts

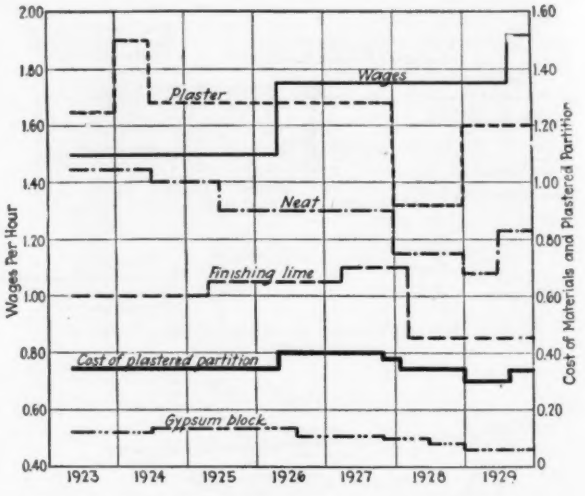
By Jac C. Holman
President, Holman Construction Co., New York City

GRAPHS indicating the trend of prices in building construction are familiar, but they apply to the entire cost of construction and to that extent are helpful only in obtaining a general idea as to what is occurring in the industry, but they cannot tell the entire story. To determine the effect of increased wages on the cost of the finished product, the writer has prepared the accompanying graph from a seven-year study and record of costs of individual items entering into building construction.

The graph shows the cost of materials and wages in a 3-in. gypsum-block partition, plastered on both sides with one coat of brown and one coat of white, but is indicative of the effect of increased wages in building costs. While the writer is not justified in generalizing from the results obtained in the investigation of one product, sufficient evidence is furnished to justify an examination of all unit costs to see whether or not the same conditions prevail. Although this graph represents but one detail of building construction, the writer cannot avoid reaching the conclusion, from experience spread over a number of years and illustrated by the graph, that an increase in wages in the building trades is accompanied for a time by decreased output with the result that the increase in cost of a finished product is equal in percentage to the increase in wages.

The total cost of labor and material shown in the chart includes delivery of material from the curb to the location in the building where the wall is to be erected, the cleaning up after the bricklayers and the plasterers, and the erection and removal of scaffolding. The prices of block and plastered partition are given per square foot. The price of lime, neat and plaster are given per bag.

In plotting the wage curve, plasterers' wages per hour are used to indicate the trend, inasmuch as the wages of bricklayers and laborers affecting the cost of the finished



GRAPH SHOWING RELATION OF INCREASE IN WAGES TO INCREASE IN COST OF FINISHED PRODUCT IN BUILDING CONSTRUCTION

product were increased about the same percentage and at about the same time as were those of the plasterers. Analysis of all the graphs shows that the cost of finished product is practically uniform from May 1, 1923, when cost-keeping was begun, to May 1, 1926, when wages were increased. During this period the increase in the cost of plaster and lime was practically balanced by the decrease in the cost of neat. On May 1, 1926, there was an increase in wages of 16 per cent and an increase in the cost of the finished product of about the same amount. Since the cost of labor at this time is only 45 per cent of the total cost, and since the cost of material as well as all other conditions affecting this product remains unchanged, the disproportionate increase in the cost of the finished product can be accounted for by the writer only by the inefficiencies of labor resulting in restricted output. This conclusion becomes more apparent by an examination of time sheets.

Subsequent reductions in material cost disclose their effect on the diagram, so that from January, 1928, the cost of finished product gradually drops until in August, 1929, it has reached a point lower than that prevailing in 1923. On Aug. 24, 1929, an increase in wages of 10 per cent results in a rise of the wage curve. This time the increased cost of finished product is 13 per cent. During this period there has also been an increase in material cost of 3 per cent. It again develops that the full increase in wages is reflected in the cost of the finished material, although at this time wages constitute 65 per cent of the cost of the finished product.

In securing the data for this article, the writer considered installations involving not less than 1,500 sq.ft. per floor, while the range extended up to 5,000 sq.ft. per floor.

New Mexico Continues Water Resource Study

To continue water supply and development investigations, the state engineer's office of New Mexico expended approximately $125,000 during the past fiscal year. The work was in charge of Herbert W. Yeo, state engineer, and among the major items of the study were the feasibility of reservoir sites on the upper Gila River, the investigation of storage possibilities on the San Juan River and the routine work of stream gaging.

Tokyo's Underground Railway

Steel Piles Driven in Advance Carry Steel Framing for Street Deck—Box-Type Subway of Steel Frames in Reinforced Concrete—Proposed Municipal Subways

By H. Sakakibara
Tokyo, Japan

UNDERGROUND railway construction on a somewhat extensive scale is being carried on at Tokyo for the electric rapid-transit line of the Tokyo Underground Railway Co., part of which is already in operation, as shown in Figs. 1 and 2. This line is to be about 8½ miles long, from Ayakusa Park to Shinagawa, built under the streets of the most congested section of the city. It was projected by Tokuji Hayakawa some fourteen years ago, but financial difficulties and the earthquake of 1923 delayed construction until 1926.

The first section was opened in December, 1928, between the Uyeno and Kaminarimon stations, 1½ miles. This section, costing about $3,000,000, connects the Tohoku main-line terminal with the government electric elevated railway at Uyeno; the second section, of 1 mile, to Kanda, parallels this elevated line. The subway line will be operated eventually in connection with the proposed 50-mile municipal subway system (Fig. 2), described in *Engineering News-Record*, June 11, 1925, p. 971. This system is now being studied, particularly in regard to methods of financing the project. The second section of the company's subway, from Uyeno to Manseibashi was opened Jan. 1, 1930, and work is now in progress on the third section, to Kandagawa, ½ mile from Kanda. This last work includes about 400 ft. of construction of a highway bridge simultaneous with the subway work.

Typical Construction—The subway consists of a double or twin tube having rectangular steel frames of I-beams spaced 5 ft. apart and embedded in heavy walls, floor and roof of reinforced concrete. At stations the middle wall is replaced by a row of columns. This typical design is shown in Fig. 3, while Fig. 4 is a section of the wider construction at stations having side platforms. The depth from the street to the platform level is 30 to 50 ft., stairs being provided for the use of passengers.

Tracks of standard gage are laid with 100-lb. T-rails and steel tieplates fastened by screw spikes to wood ties 8x9 in. and 8 ft. long; the 90-lb. third rail is carried on ties 9 ft. long. Stone ballast is used on the first section only. On other sections and in the stations and the car shed there is a bare concrete floor with recesses for wood blocks which carry the rails, as shown in Fig. 4. The ties and rail blocks are not creosoted.

Soil Conditions—For the entire distance from Asakusa Park to Shinagawa borings show strata of sand and com-

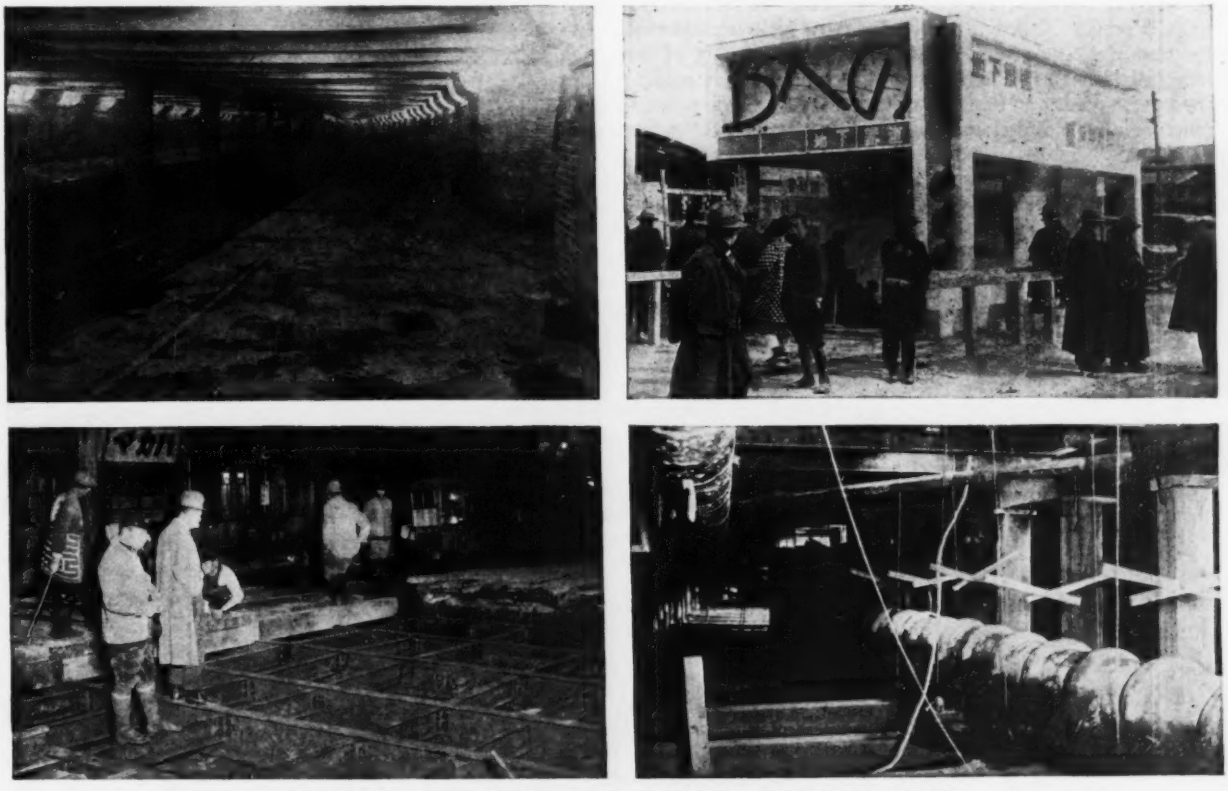


FIG. 1—ELECTRIC UNDERGROUND RAILWAY AT TOKYO, JAPAN
Top, left: interior of Uyeno Station. Top, right: street entrance to station. Bottom, left: steel deck for temporary street paving, built in advance of excavation. Bottom, right: sewers and conduits supported in subway excavation.

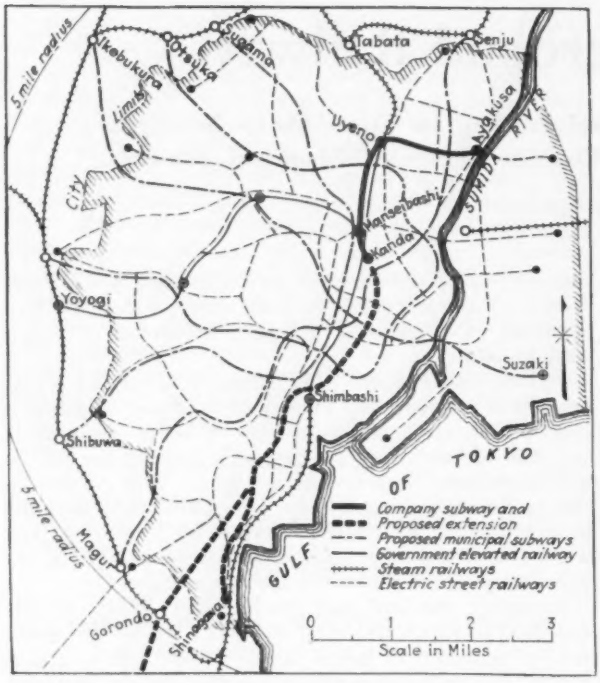


FIG. 2—RAPID TRANSIT SYSTEMS OF TOKYO

pact clay to depths of 10 to 20 ft., while coarse gravel or compact sandy clay is found at 40 to 50 ft. The material is easily excavated and contains very little water; only in soft soil along the river will piling be necessary to support the subway. (Pneumatic shields will be required for the municipal line that passes under the Sumida River.) Excavation is done by pick and shovel, the material being hoisted by skips. A small part of the material is used for backfilling; the remainder is sold to the government and hauled in dump cars by gasoline locomotives and dumped into barges for use in filling low ground.

Before excavating, a row of 12- or 15-in. I-beams, 5 ft. apart, was driven along each side by pneumatic pile hammers to an average depth of 30 ft., the tops of these I-beams being about 12 in. below the street surface. One of the piledrivers was designed specially by M. Totake, chief engineer, for easy portability in the busy streets. Transverse steel channels were laid upon these supports, and short beams framed between the channels formed a framework to carry the wood joists and planking of the temporary street paving (Fig. 1). As the numerous water and gas mains and electric conduits and cables were encountered in excavation, they were suspended from the steel framing until provision could be made for rearranging them, as is also shown in Fig. 1. A 6-ft. arch sewer was encountered at a depth of about 16½ ft. and was replaced by a siphon composed of two 42-in. steel pipes for normal flow and one 30-in. pipe for stormwater flow. Timber posts with longitudinal caps were placed under the middle of the temporary steel roof framing, in advance of the permanent steel posts.

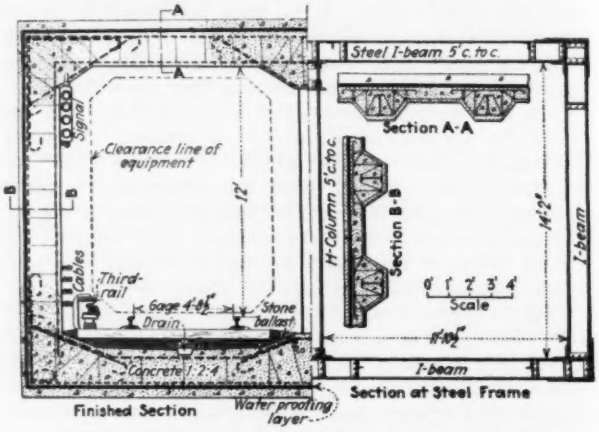


FIG. 3—TYPICAL SECTION OF PRESENT SUBWAY

Concreting—Short horizontal planks were fitted between the webs of the I-beam piles to hold the sides of the excavation, and before the concreting these boards were covered with 2½ in. of mortar applied by a cement gun. Sheet-iron shields protected the piles from this coating, so that they could be withdrawn and used over again, but the boards were left in place behind the concrete walls.

On the subgrade was laid a 6-in. bed of concrete,

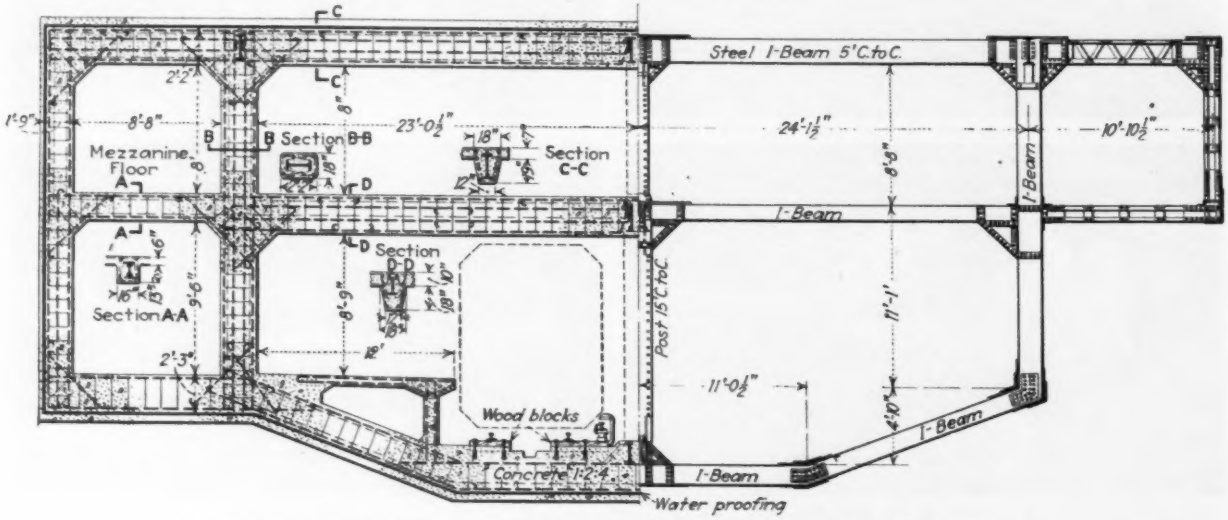


FIG. 4—TYPICAL SECTION AT SIDE-PLATFORM STATION

covered with a three-ply waterproofing course of felt and hot asphalt. Then the structural-steel framing was erected, the reinforcing steel was placed and concrete for the walls and roof was poured through chutes from a portable mixing plant on the street surface. The waterproofing course was carried up in the walls and across the roof. Seepage water was drained to sumps about 1,000 ft. apart and pumped to sewer inlets by pumps with electric motors of 7½ hp.

Ventilation of the completed subway is provided by openings 4x30 ft. at the stations, these being fitted with steel gratings, so that the air is expelled in front of each train and drawn in behind it. Electric lighting provides 4 cp. per square foot of floor area in the stations, while lights in the tunnel are 100 ft. apart. Block signals are of the color-light system. Decorative tile finish is used in the stations. Train equipment consists of steel cars having 40 seats and also 80 straps for standing passengers. These cars have pneumatically operated sliding doors and indirect electric lighting. Each car has two electric motors of 120 hp., designed for an average speed of 15½ miles per hour and a maximum of 35.

This subway was designed by and construction commenced under Kunie Abe, who is now director of the engineering department of the Tokyo municipal electricity bureau. He was succeeded by M. Totake, the present chief engineer of the Tokyo Underground Railway Co. Construction work was done under contract by the Okura Co. in the first section. The Oboyashi Gumi Co. built the second section and is building the third section, which is expected to be completed by the fall of 1930.

City Problems Discussed at Richmond

American Society for Municipal Improvements Deals With Current Questions Ranging From Airports to Traffic Control—Adopts New Name to Express Engineering Character

Engineering News-Record Staff Report

PAPERS and discussions covering a wide range of interest occupied the American Society for Municipal Improvements last week in its convention at Richmond, Va. Major items of the program were traffic, its control and provisions for meeting its extensive increase; city planning in its relation to traffic; paving, trends in designs and construction; sanitation as affected by water, sewage and garbage factors; the airport problem in its basic elements of service, drainage, surfacing and control of traffic; and public utility relationships. In addition numerous committees reported on these functional subjects, and eighteen other committees reported on the society's specifications.

Perhaps the most substantial interest of the members still relates to paving, but city planning, traffic control, airports, and sanitation subjects are rapidly increasing in popularity for presentation at its conventions. This has come about because traffic congestion is a most serious problem confronting cities. Control palliatives and basic corrective measures grounded in city planning are, therefore, of primary importance to their engineers. Viewed in this light the otherwise unbalanced program appeared logical, especially as 93 per cent of the society's membership now consists of engineers.

The predominance of engineers in the organization, and the need for concentrating attention upon functional subjects, led to a change in the name of the society by unanimous vote of the board of directors, as noted in our news pages this week. The new name is American Society of Municipal Engineers.

In the following notes are given freely abstracted portions of papers and reports relating to the subjects enumerated.

Street Traffic

"Steady Flow" System—Street crossing without intersection of traffic and without grade separation is now called the "steady flow" system. Fritz Malcher, town planner and traffic consultant, New York City, described the system and its economic value, discussing traffic circles, middle strips and irregular islands. His conclusions follow:

Regardless of theoretical maximum capacities, we must always remember the rule of "the full glass of water." Conservative calculation places the maximum capacity of one lane of the oblique crossing area at 1,800 vehicles an hour moving 10 to 20 miles per hour, and the maximum capacity of each lane joining or leaving the crossing line at 900 vehicles per hour. The task of the traffic police or the town planners and, in existing cities, of the zoning engineers is to prevent overtaxing this capacity. The smaller the density of traffic the greater will be the economic value of the "steady flow" system and the possibility of increasing the velocity, whereas under the synchronous stop-and-go system every vehicle must wait for the green light, even when its own lane or the cross street at the intersection is entirely free of traffic.

The essentials of the proposed system can be explained in a very few readily understandable words. Under the synchronous stop-and-go system, one-half of the traffic, on the average, is intermittently blocked. The street capacity of this interrupted vehicular traffic we have valued at 100 per cent. The "steady flow" system, on ordinary street layouts, if there were no pedestrian traffic, would permit the uninterrupted flow of double that volume of vehicular traffic, or 200 per cent, the increased drive length being offset by increased density and velocity. The obstruction of the roadways by pedestrian traffic, however, reduces vehicular traffic capacity in existing cities to as low as three-quarters of that just mentioned, or 150 per cent. New installations, in accordance with the "steady flow" system and with complete separation of pedestrian traffic, will improve traffic conditions and increase the vehicular capacity to 250 per cent.

H. S. Simpson, research engineer, American Electric Railway Association, New York City, described graphically the "battle of the streets," where no one wins. He suggested that, before grandiose schemes for two- and three-deck highways are considered, the streets be freed from stored vehicles and that greater use be made of more efficient passenger carriers. However, he said, arbitrary condemnation of all parking is completely unjustified, as terminal facilities are essential if a vehicle is to be of any value in transportation. He envisioned the time when every one will intuitively drive to the nearest garage and no more thing of parking at the curb than on the sidewalk. However, the building

cubage required by those who use private automobiles is twice that of those who use public carriers and restricts seriously the ultimate extent of garaging.

As to enforcement, he stated that it is so poorly carried out that many cities are still living in a glorified hitching-post age. The whole scheme of business property use and valuation is predicated upon persons who buy merchandise and transact business, not on vehicles, which are a means to an end. Congested areas are congested with vehicles, not persons, but the result is inaccessibility, and finally decentralization takes place. Almost overnight an unhealthy change in accessibility may upset potential worth and use characteristics. Maximum capacity of streets becomes of more importance at the end point than maximum speed. While in motion a person in an automobile requires an area of 775 sq.ft., in street car or motor bus 49 sq.ft., as a pedestrian 13 sq.ft. The capacity of a single traffic lane on a typical street with 76-ft. pavement with parking permitted and with 12-ft. sidewalks has been determined by Mr. Simpson's association as follows: street car lines, 11,480 persons per hour; motor buses, 5,265; automobiles, 1,350; and sidewalks (effective width 10 ft.) 8,000.

Parkways vs. Superhighways—Jay Downer, chief engineer, Westchester County Park System, in his paper on "The Comparative Advantages of Parkways in Interurban Planning Over Superhighways" said that there is little difference so far as efficiency for traffic is concerned, that the parkways offer much more from the esthetic standpoint, and that the economics are against the superhighway, if the relationship to abutting property be taken into account. Sufficient experience has now been accumulated to demonstrate that modern traffic routes may have a detrimental effect on the neighborhoods they traverse. Extensive road-building programs have sanctioned the erection of enormous frontages, far in excess of what can be utilized for business and industrial uses. Only about 20 per cent of the frontages in the New York region can be absorbed for business, leaving 80 per cent to lie unproductive unless utilized for residential development, and along superhighways this is not desirable. Along the Westchester parkways, however, much land is suitable for residential purposes, and such property valued ten years ago at $3,000 per acre is now worth $87,000 per acre.

Intersection Traffic—Delays incident to traffic may be reduced in two primary ways: (1) by removing the obstruction created by the intersection; (2) by control of the traffic flowing through. The first method, said E. P. Goodrich, consultant, New York City, involves such major improvements as ring boulevards or traffic circles, separation of grades, or widening of intersections. With an ordinary good intersection this is necessary only after traffic volume reaches 2,400 vehicles per hour. The second method calls for traffic officers, signals and other artificial means of control.

In a comprehensive report on traffic control, E. A. Kemmler, chairman of the committee on the subject, reviewed the situation and literature to date. Some of the pertinent facts brought out are that the necessity for multi-level streets is the result of defective city planning. The demand for elevated sidewalks is based on the same fallacy, he feels. Traffic circles do not reduce traffic congestion. Nor do street widenings without close engineering study and, after construction, close supervision as to parking. He deplored the fact that so few schools teach traffic engineering and he pleaded for the adoption of the uniform traffic rules and codes put out by the National Conference on Street and Highway Safety. The convention acceded to this request.

Committees on municipal contract forms, drain pipe, street lighting, wood poles, clay and cement sewer pipe, and brick and brick sizes reported only minor matters, mostly with reference to meetings with other organizations.

Paving

The stone block committee recommended returning to the 3- to 4-in. size for Durax blocks, the 2¾-in. size having proved to be too small.

A preliminary draft of a specification for portland cement concrete pavement was submitted for consideration only. It covers average conditions for plain and reinforced-concrete pavements. It follows the A.S.T.M. specifications for cement adopted in 1926 and has been revised to include modern practice. It is put out for a year's trial, and criticisms as to its workings are requested.

No suggestions have been received as to change in the brick specifications adopted by the A.S.M.I. by letter ballot last January.

The subgrade and foundation committee stated that the specifications need revision but asked only for suggestions for consideration by next year's committee.

The bituminous pavement committee received severe criticism for not bringing in some kind of specifications.

A request for the reprinting of all available specifications brought out the fact that many are four years or more old and need revision. A list or index will be printed as a compromise.

Highway Sidewalks—A campaign of education on the construction of highway sidewalks has been undertaken by the committee on the subject, headed by George C. Warren, Boston. In the rush to build roadways the laws of most states have been so framed as not to permit the use even of state funds for walkway construction. The committee has been instrumental in getting a law passed in New Jersey permitting the use of state funds for sidewalk construction, in which case, the use of the roadway is prohibited to pedestrians. Similar laws will be advocated in other state legislatures next winter.

"Improving Curb-Line Appearance" was the subject of a paper by W. B. Vick, sales engineer, Union Metal Mfg. Co., Canton, Ohio, in which he stressed the advertising value to a town of cleaning up its curb-line appearance. Removal of everything not necessary to the proper functioning of the thoroughfare was recommended. The new Canal St. improvement in New Orleans was noted, with its artistically painted lighting standards as well as green colored sidewalks to reduce sun glare and colored curbs to denote parking regulations. Detroit on lamp posts uses gun metal gray, and Washington battleship gray. Gary uses the latter color with a little relief of a darker shade. Red and blue are the colors used in the Chicago Chinese district. Pittsburgh uses an aluminum finish, and St. Petersburg, Fla., aluminum and green with green sidewalks.

Airport Development

The society's committee on airports, of which Perry A. Fellows is chairman, presented a report consisting of several papers prepared by members of the committee. W. W. Horner devoted his part of the report to a discussion of drainage and its relation to surfacing, particularly as he has applied it at the St. Louis municipal airport. The important and extensive surfacing experi-

ments carried on there were described by Mr. Horner in *Engineering News-Record*, Nov. 7, 1929. It is Mr. Horner's opinion that while the amount of free water and the length of time it is to be allowed to stand on the field will vary with the importance of the port, already many fields are designing their systems of rainwater takeoffs on the basis of practice now prevailing for municipal storm systems. Regardless of whether a field is to be developed as an all-over field or partly surfaced with runways, drainage is the first essential.

Asphalt Runways—Runways of asphalt have proved satisfactory because of their resilience, ease of construction and repair, dustlessness and the fact that they may be constructed as tough as is desirable. At present there is a distinct trend toward the use of the higher types of asphalt pavement. At Burbank, Calif., 300,000 sq.yd. of two-course asphalt pavement has been placed. This consists of a 2½-in. mixed-in-place base and a 2½-in. hot-mixed topping. At Columbus, Ohio, because of unstable soil conditions, runways were built with a 5-in. concrete base and an asphalt wearing surface, composed of 6 per cent bitumen, 6 per cent mineral dust, 28 per cent graded sand and 60 per cent stone. At the new Detroit municipal airport, sheet asphalt identical with that used for street paving has been used for the runways.

Concrete Runways—Four-fifths of the yardage of concrete used for runways in the United States is located on five fields—Detroit municipal; Wayne County; Ford, at Dearborn, Mich.; Grand Central, at Glendale, Calif.; and New York City municipal, according to the committee's report. In the opinion of the committee, design and construction of concrete runways should be in the hands of experienced engineers, preferably with highway training, inasmuch as runways are highways for specialized traffic. Some of the advantages of concrete for runway service are that it is free from inequalities of surface, provides necessary strength, maximum tractive resistance, and visibility by day or night.

Three types of cross-section have been used—crowned, flat slab sloped from one side to the other, and dished. The first two types are satisfactory when the surrounding ground is of a character that will take up runoff water quickly. Dished slabs are probably best on any soil except firm, permeable soil. An advantage of the sloped flat slab is that its width may be easily doubled. Its disadvantage is that runoff is concentrated on one side.

Runway grades should be as flat as possible. Values of ½ to 2 per cent were cited. Slab thicknesses are debatable because of uncertainty of future plane development and lack of knowledge of landing impact forces. Present thicknesses are 7 to 8 in., with thickened edges in common use.

The function of steel reinforcement is more to prevent the growth of cracks than to increase strength. Where settlement of the slab is not to be expected, the possible saving by omission of reinforcing steel is probably justified, in the opinion of the committee.

At present the prevailing width of concrete runways is 100 ft. These runways are usually made up of 12½-ft. lanes tied together by keyed joints (Detroit) and by ⅝-in. steel rods (New York). Transverse contraction joints are necessary at 30-ft. intervals, and 1 in. of expansion material should be provided for each 100 ft. of runway. A wood-float finish is satisfactory and is particularly advisable for night flying service.

Mix proportions are not radically different from those used on highways. At the Detroit municipal airport a 1:2:3 mix was selected. The water-cement ratio was indirectly controlled by limiting the slump to 3 in. At the Wayne County airport a water-cement ratio of 5 gal. to the sack was adopted to provide a strength of 4,000 lb. per square inch. At the Ford airport 5¼ gal. of water per sack was used and the slump was limited to 1 in. At the New York field the specifications permit not more than 5½ gal., a slump between 1½ and 2½ in. and approximate proportions of 1:2:3½.

Sanitation

Garbage and Refuse—Through a long series of computations of the heat values in mixed garbage and refuse, Dr. E. E. Butterfield, consulting chemist, Forest Hills, N. Y., concludes that if the material collected in a given town is first dried artifically it will furnish enough power "to satisfy the power requirements of most of the existing sewage-disposal plants," including those using the activated-sludge process. The computations were based on the assumption that, for garbage, "the total heat of combustion and the elementary composition of garbage can be accurately computed from the content of the garbage in protein, fat and carbohydrate as determined by the standard methods of food analysis," while for rubbish the "chief combustible is cellulose derived from wood, cotton or other fiber." Mr. Butterfield is chairman of the A.S.M.I. committee on refuse disposal and street cleaning. Some of his conclusions are: Heat units in garbage and refuse vary within wide limits due to water content but within narrow limits if dried. One-sixth of the heating value is lost when burned in the "as received" state. Hence it is desirable to dry the garbage, which is then equivalent to wood.

Sewerage—Allocating by four different methods the cost of stormwater sewers among municipalities all lying on the same watershed was described by Edward S. Rankin, division engineer, division of sewers, Newark, N. J. The methods were as follows: (1) Assume the area to be one municipality, cost to be spread equally by direct assessment or bond issue with some additional assessment on property subject to flooding. Obtain the cost of existing and proposed sewers. Proportion this cost to the respective areas, and deduct the cost already incurred to arrive at proper allocation. (2) Take no account of sewers already built but assume that the lower municipality is obligated to care for the natural flow from the entire watershed. The upper municipalities pay for improvements due to improvements in their respective areas. (3) Charge to the lower municipality that portion designed to care for its own runoff, then divide the remainder proportionately. (4) Proportion the cost directly to the area.

Asa E. Phillips, consultant, Washington, D. C., chairman of committee on sewers, recommended for adoption standard specifications for reinforced-concrete sewer pipe, these being the same as those recently submitted for adoption as tentative standard to the American Society for Testing Materials. Mr. Phillips urges users of the specifications to report shortcomings and information as to failure to secure satisfactory results in actual construction due to defect or inadequacy of the specifications.

The report of the committee on uniform street sanitation records of the International Association of Street Sanitation Officials was presented by D. C. Stone, director. This consists principally in fixing the curb-mile as the basis for street sweeping, the ton as a measure of garbage and refuse and the cubic yard as the unit for reporting catchbasin material. It was decided to ask the

members to use the recommended uniform practice for a year and then bring in criticisms.

The sewerage and sanitation committee, headed by A. P. Learned, consultant, Kansas City, brought in suggested standard forms to be used by operators of sewage-disposal works in recording results obtained.

Explosions in sewers may be avoided, the committee reported, by keeping inflammable liquids out of sewers, by protecting individual buildings against the sewer system, by ventilation, and by keeping the outlet open or providing means of air circulation in the lower end of the sewer. A number of experiences with accidents were reported.

Drainage — The Schockoe Creek drainage district drains half of Richmond, 12 square miles in area. G. C. Molleson, division engineer, department of public works, described the project, its design and construction three years ago and its operation to date. Floods occurred from restrictions and encroachments on the stream as well as from high water in the James River backing into low area of the city. The 2.4-mile drain has a semi-elliptical arch design for all but 6,000 ft. of box section where the line had to be confined between the original stone walls of the creek. The largest arch section, 2,600 ft., was 29x16¼ ft., designed on the ring theory; the box section was designed as a rigid frame. To prevent river water backing into the low section, two branches were built. One is without inlets below maximum flood slopes, to carry the runoff from the upper sections, and is open to the river at all times. The other acts as a receiving sewer for all connections from storm and sanitary sewers lying below maximum river stage and is provided with gates at the fork and at the river. It holds 300,000 cu.ft. of water, which is removed during high water by four 20-in. centrifugal pumps. In operation an attendant 40 miles upstream notes the rise of the river and wires the readings at every 5-ft. change. It takes 12 to 24 hours for the rise to reach the city, and then but 50 to 60 per cent of the rise is experienced. Since the station has been placed in operation only one rain has occurred during a flood and only one pump was kept running continuously. One engineer is in charge and inspects the plant daily and makes a five-minute test run of all pumps. During floods two twelve-hour shifts of four men each are used.

Water Purification and Softening

Water—Marsden C. Smith, water and electrical engineer, Richmond, Va., described the problems of the local purification plant, which has to treat the highly polluted James River water, a task unusually difficult this year on account of the low stage of the river. Elimination of sticky paper-mill wastes, correction of pH with sulphuric acid, use of prechlorination and postchlorination, chloramine treatment and copper sulphate for algæ, and aeration to reduce odors and release carbon dioxide, have all been needed to produce a suitable supply.

Charles P. Hoover, consultant, Columbus, Ohio, gave a valuable paper on water softening for the city engineer contemplating softening or needing ammunition in a campaign. Ohio has 34 and Pennsylvania has 20 of the 134 plants softening water in this country. As figured on soap consumption and other incidentals, he concluded the citizen in Columbus could afford to pay five to six times what he does pay for soft water. He answered the bad taste complex argument and mentioned the trends to carbonization and zeolite treatment for residual hardness.

John F. LaBoon, consultant, Pittsburgh, described the Nashville plant, stressing the waterproofing experience with the 50-m.g.d. Kirkpatrick Hill reservoir, which failed in 1912 from seepage softening the base, new leaks developed later and finally nearly $250,000 was spent on 12-in. concrete lining, guniting and asphaltic membrane. The 28-m.g.d. filters completed in 1929 at a cost of $587,000 were called on for 32 m.g.d. this season.

City Planning

Units going to make up a typical street cross-section have been studied by the committee on city planning, headed by Jacob L. Crane, consultant, Chicago. He presented results of a questionnaire of 30 questions answered by 125 members on street-design units. Traffic-lane widths varied generally from 8 to 12 ft., with a great predominance of 10 ft. on all but strictly minor streets. For parking parallel 7 ft. or 8 ft. were the most frequent figures given. Normal sidewalk widths varied from 15 ft. to 20 ft. in principal business districts and from 4 ft. to 6 ft. in single-family districts. Minimum reasonable widths of provements between curbs for strictly minor residential streets varied from 24 to 30 ft.

Trends in Condemnation Procedure are toward a simplification in the law and its interpretation, toward action by administrative rather than judicial bodies without opposition of the courts, toward quicker financing, toward financing by assessment with the city issuing bonds for immediate payment to the owner, and toward setting up qualifications for commissions for condemnation and making them permanent. These trends were given by W. C. Bernard, municipal and valuation engineer, St. Louis.

Zoning Retards Building of certain kinds, and that is what it is for, but Francis J. Mulvihill, chief of the division of city planning and municipal engineering, Pennsylvania, could not find in a long analysis of building operations as a whole in his state that there was any inhibitive effect.

Paving in Small Cities has become unduly burdensome to property owners, and Prof. Harry Tucker, North Carolina State College of Agriculture and Engineering, stressed the necessity of engineers, in these times of deflated property values and general financial depression, being economists as well as technical advisers. He referred to the examination into the merits of cheaper pavements and more equitable methods of spreading assessment rolls. The front foot, area, zone-and-area and benefit-factor methods were detailed, with the last-named method preferred. In his opinion, local property in residential areas should not be assessed more than 50 per cent of the cost, and main business streets and arterial highways should be financed entirely from general funds.

Maps—The topographic maps of Richmond, Va., which are now being brought up to date, would have saved $500,000 had they been available prior to annexation of 13 square miles in 1914, by securing proper location of streets and rights-of-way subsequently condemned and purchased for drainage and sewers. Similarly, said George J. Parrish, division engineer of surveys, Richmond department of public works, a potential saving of $1,500,000 in the next annexation has been established. When it is considered that the 200-ft.-scale maps cost $1,750 per square mile and the 400-ft.-scale maps only $750 per square mile, the return on the investment is apparent.

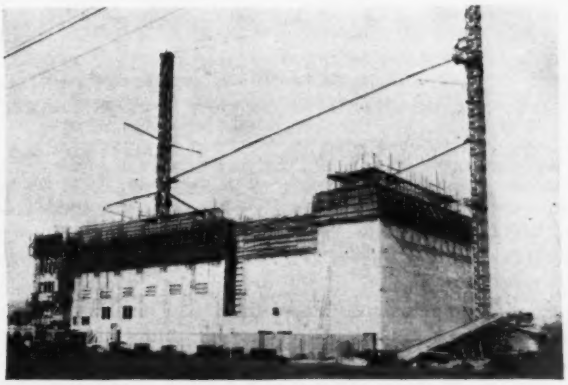
From Job and Office

Hints That Cut Cost and Time for the Contractor and Engineer

Concrete Distributed by Two Towers Connected by Adjustable Chute

USE of a chute suspended from a high line between two towers at opposite ends of a long theater building was the economic solution of a concrete distribution problem encountered recently in Beverly Hills, Calif. A small corner lot which dictated the location of the concrete plant at the inside rear corner and a high tower section at the front of the building necessitated this unusual arrangement. The building is 230x130 ft. in plan and 78 ft. high except for the front section, which is 120 ft. high. An unusual feature of construction is the use of a corrugated sheet-metal roof covered with gypsum mortar and topped with composition roofing.

Near the concreting plant a hoisting tower 247 ft. high was erected. From this location it was necessary to distribute concrete to the front corners of the building, almost 250 ft. distant. To accomplish this a 187-ft.



CONCRETE CHUTES SUSPENDED FROM TWO TOWERS
Hanger cables adjustable to regulate height and slope of connecting chute.

secondary tower without hoisting equipment was erected near the front of the building midway between the sides. The two towers were connected by a 1-in. cable which supported a 12-in. metal chute on a 1:3 slope, as shown in the accompanying illustration. Hanger cables passed through pulleys at the high line and extended to the rear tower to permit adjustment of the chute at any desired height or slope. From the towers, secondary chutes enabled concrete to be distributed to all parts of the structure. Wooden drop chutes used for final distribution were provided with baffle boards to check the fall of the concrete.

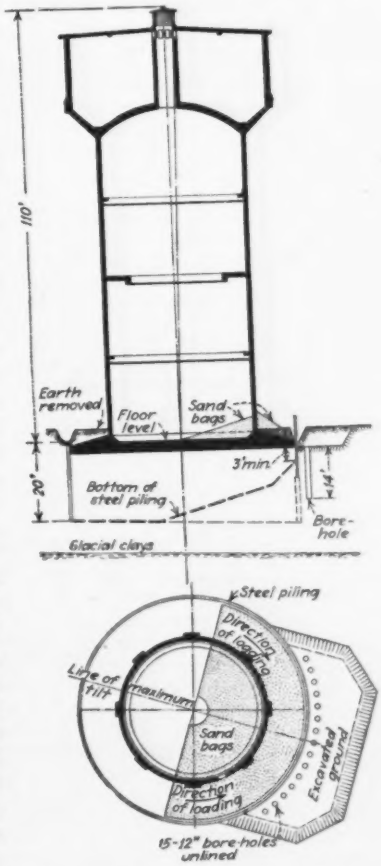
Unusually large and heavy form panels were economical because of the large expanse of blank walls. The largest panel was 80 ft. long and 12 ft. high and was provided with special inside forms to produce pilasters and other wall projections and at the same time maintain the outside timbers in a straight line to facilitate bracing. Inside and outside panels were bolted by continuous rods.

An unusual feature of construction was the roof, which consists of a structural steel frame covered with corrugated sheet iron topped with a layer of gypsum and composition roofing material. Trussed steel joists between the roof trusses were covered with 20-gage corrugated iron spot-welded in enough places to secure rigidity. At other points slot-type fastenings provided contraction joints. Gypsum mortar, containing a retarding agent to provide a 30-minute period before setting, was spread over the corrugation to give a 1-in. minimum thickness and a smooth surface. Redwood strips resting in the grooves of the iron and embedded in the gypsum provided nailing strips for fastening the top covering.

The structure was built by the Herbert M. Baruch Co., of Los Angeles, and the roof construction was the design of Zara Witkin, chief engineer of the company.

Righting a Tilted Water Tower

HOW the Skegness water tower, a concrete structure 110 ft. high which had become tilted to a considerable degree, was brought back to a vertical position is described in a recent article in *Engineering* (London). Although based on a heavy concrete mat, the tower, upon first being filled with water, gradually settled until, in the course of time, the center point of the roof was more than 2 ft. out of plumb. Investigation proved that the trouble was due to the presence in the subsoil (which consisted for the most part of black and brown sandy clay with much water in the lower beds) of patches of spongy peat. To remedy this situation it was concluded that some subsoil should be removed from under the high side of the base. In order to do this, a complete circle of interlocking steel sheet-piling was driven around the base of the tower, that on the low side of the tower



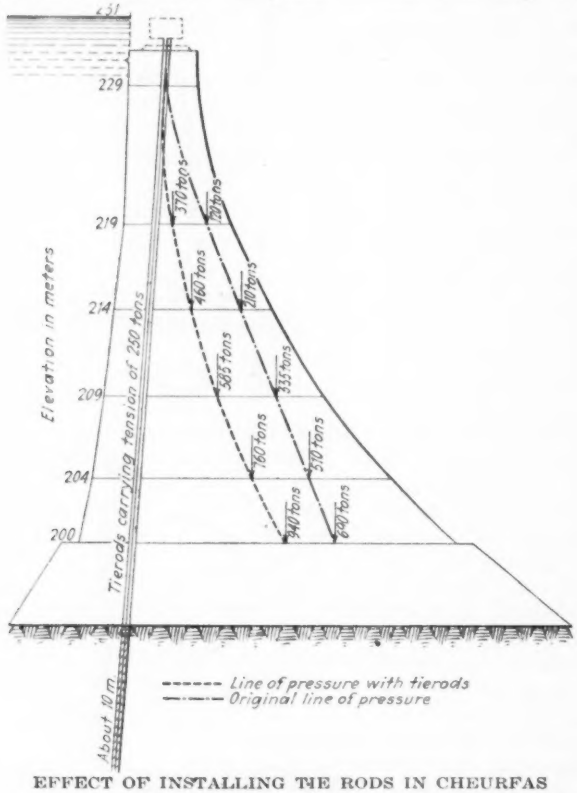
RIGHTING SKEGNESS WATER TOWER IN ENGLAND

being driven farther down than that on the high side. Depths of penetration varied from 20 ft. to a minimum of 3 ft. Immediately adjacent to the piling on the high side of the foundation a series of fifteen 12-in. holes were bored, each of which was 14 ft. deep with the lower portion unlined. The high side of the tower base having been loaded with sand bags, extrusion of the subsoil immediately commenced through the boreholes and continued for a period of about six weeks. During this time the tower gradually regained a vertical position. The direction of movement was readily controlled by removing material from the boreholes toward which movement was desired. As soon as sufficient settlement had taken place, all the piling was driven to the full depth; since that time no appreciable movement of this tower has occurred.

Steel Rods Stabilize Gravity Dam

AN UNUSUAL method of reinforcing gravity dams which has been successfully applied in raising the Cheurfas dam in Algeria is described in a recent number of *Le Génie Civil* (Paris) by A. Coyne, chief engineer of bridges and roads of the Department of Haute-Dordogne, France. In the case cited a gravity dam was strengthened by boring a row of holes 4 meters apart along the upstream face, extending from the top of the dam well into the foundation. Rods of high-quality steel were placed in each hole, anchored to the foundation material and placed in tension, superimposing an artificial surcharge upon the upstream section of the dam and shifting the line of pressure toward the upstream face. After the proper tension had been applied, the holes were sealed for their entire length.

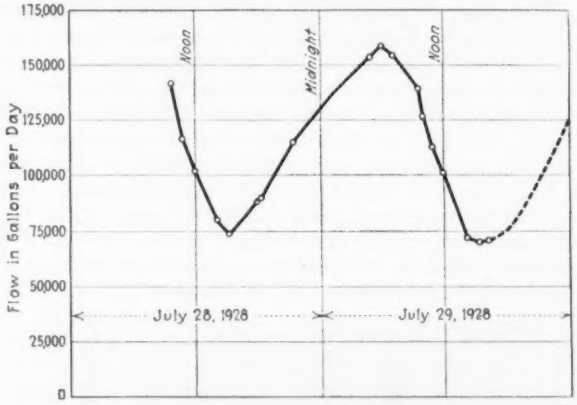
Several advantages are claimed for this type of reinforcement. In the first place, the holes, as they are drilled, provide a check upon the condition of the masonry near the upstream face and also on the foundation material. Putting the rods under tension provides an automatic check upon the adequacy of the anchorage for each one. Finally, the repair can be made with the dam under full load and in continuous service.



EFFECT OF INSTALLING THE RODS IN CHEURFAS DAM, ALGERIA

Transpiration Affects Streamflow

IN CONSTRUCTING a water-supply system for the naval ammunition depot at Hawthorne, Nev., flow measurements were carried on carefully in Rose Creek, a small stream near the depot. Diurnal variations of a striking nature were observed. They were ascribed to



TYPICAL DIURNAL FLUCTUATION IN ROSE CREEK

vegetation along the stream. In July, 1928, when hourly readings were made at a weir on Rose Creek, the rate of flow in a typical 24-hr. period ranged from 67,900 gal. per day at 3:15 p.m. to a maximum of 159,000 gal. per day at 6 a.m. The noticeable decrease in flow as indicated in the accompanying graph began just after sunrise and before there had been any change in temperature sufficient to cause an appreciable increase in the evaporation rate.

The explanation suggested by A. B. Purton, district engineer, U. S. Geological Survey, who made the observations, was that as soon as the sun rose, transpiration from the willows along the creek bed occurred at once, with consequent increased draft on the water flowing in the creek. The watershed above the point of observation is relatively small and a heavy growth of vegetation is concentrated near the streambed. Under these conditions it is quite possible that stream fluctuations due to transpiration would be more pronounced and less subject to other influences than in larger watersheds with more widely distributed vegetation, where flow fluctuations could be smoothed out to some extent by time lag.

The diurnal fluctuation of flow again was observed in May, 1929, but the variation between maximum and minimum rate then was much less pronounced than during the previous July. A possible explanation of this may be in the fact that the flow in May was no doubt appreciably larger than in July and probably contained a considerable amount of direct surface inflow from melting snow banks. Melting snow as a source also would be subject to diurnal fluctuations and these would not synchronize exactly with those due to transpiration, so that the net results might well be a smoothing out of the graph.

Letters to the Editor

Culvert Failures Under Fills

Sir—The point of view with which Mr. Spangler closes his letter in your issue of Sept. 4 is identical with that which I had in mind when writing my previous communication (see *Engineering News-Record*, June 5, 1930, p. 931). The case in question is one of sufficient importance to engineers and to a well-established industry to warrant the additional space necessary in your paper for the exposition of several factors not clearly brought forth.

Sixteen years' experience with rigid-type culvert installations has repeatedly brought to my attention the fact that intimate contact with a rock subgrade is disastrous to a pipe placed under a high fill. Attempts to cushion the pipe have failed more often than they have succeeded. The laws of elasticity of earth, so ably presented in bulletins of the Iowa Engineering Experiment Station in considering the fill beside and over a culvert, apply with exceptional importance to a relatively thin cushion of earth placed between the pipe and a rock subgrade. There can be no appreciable distribution of the load by such means. The concentration, transversely if not longitudinally, is nearly as great as though the pipe were resting directly on the naked rock, and the resulting flexural stresses in the lower half of the pipe are several times larger than they would be if the reaction were carried to a greater extent by the haunches. That a concrete cradle will cause such distribution of the reaction and do so more effectively than any other means is the real basis for its use. That Mr. Spangler recognizes the above-mentioned conditions is evident from the fact that he attributes the failure as being in part due to "insufficient cushion." The particular section referred to by him is one in which the actual settling of the pipe is greater than at any other point, so that obviously the cushion was not defective in this respect. The apparent trouble was that the cushion failed to distribute the reaction to the haunches of the pipe.

It is interesting to note the following conditions to which Mr. Spangler has not drawn attention: In the sketches showing the location of cracks only three pipe show cracks in the top halves and single cracks in each case. All ten pipe show cracks in the bottom halves, the total number being nineteen. There are three cracks in the bottom half of each pipe showing a single crack in the top half. Assuming that the lower cracks developed first, the upper crack would be almost sure to follow. In any case the number and location of cracks indicate that failure was due not to the load on the pipe but to the reaction under it. Since these are equal in magnitude, the difference in distribution must have been the cause of failure.

Culvert No. 3 was a complete failure and the reason assigned was that the cushion was frozen and while in this condition did not permit of the settling of the pipe, which would have reduced the load. Apparently, while in this condition it would assume to a greater or less extent the characteristics of a concrete cradle. The question arises whether the failure occurred while the cushion was frozen or after it had thawed out. According to Mr. Spangler's account the fill was placed in February and six months later it was found to have failed. There are only two possible assumptions. If failure was due to the frozen cushion, it must have occurred during the placing of the fill or very shortly after its completion. It seems incredible that such conditions obtained and remained unnoticed for six months. The more logical assumption is that the fill was completed on the frozen cushion and that the final inspection customary in such cases did not reveal any cause for worry. That other installations by the same method were started in April is an additional reason to assume that Culvert No. 3 was still in good shape. If failure occurred at some later date, it must have been due not to the freezing of the cushion but to its thawing out. The sudden collapse of the pipe support thus engendered would be ample cause for the very complete failure noted. A concrete cradle would have continued the conditions obtaining while the cushion was frozen.

The theory of load reduction advanced by Mr. Spangler is accepted without question, but it must be associated at all times with the equally important question of distribution. The evidence presented appears to justify the conclusion that the cause of failure in this case is more closely allied with the latter.

Jos. S. Lambie,
Associate Professor of Civil Engineering,
Pittsburgh, Pa., University of Pittsburgh.
Sept. 10, 1930.

* * *

Sir—I am in receipt of a copy of Professor Lambie's letter to you of Sept. 10 setting forth further thoughts relative to the cast-iron pipe culvert failures reported in *Engineering News-Record* of June 5. Professor Lambie stresses the importance of considering the distribution of pressures around the periphery of such culvert pipes, especially the supporting pressures, and with this thought there is and can be no argument whatever. It is fully as important to take into account this distribution of the reaction of culvert pipes as it is to know the distribution of load when designing a simple beam to carry such load.

Professor Lambie questions the soundness of the conclusion regarding the time of failure of culvert No. 3, supported on an earth cushion which was in a frozen state while the embankment was being built. I might say that the necessary restrictions on space available prevented the presentation in the original article of detailed evidence on which this conclusion was based. However, such information will probably be available in the near future, since it is planned to publish this material in a bulletin of the Iowa Engineering Experiment Station. Further observation of these culverts has been made during the current year and some progressive action of the structures has been noted, which will also be included in this publication.

M. G. Spangler,
Ames, Iowa, Assoc. Structural Engineer,
Sept. 24, 1930. Iowa Engineering Experiment Station.

Prequalification of Contractors

Sir—Your issue of July 10 carries an editorial entitled "Progress in Prequalification." You cut right into the quick on this question in the fourth from the last line where you refer to the fundamental principle that required qualifications must be definitely stated. Until that principle is adopted and followed the rosy path that is now being traveled by the advocates of prequalification can lead only in one direction and that is into deeper mire.

This question of establishing the required qualifications and stating them has been discussed with the officers of the A.G.C. in Washington and with many others who are ardent enthusiasts for prequalifications. However, they all want to put the soft pedal on the matter of establishing the qualification requirements.

I hope that you may see fit to keep this matter well up into the forefront, that it may receive the attention it deserves.

Harmon Swart,
President, Harmon V. Swart Associates, Inc.
New York City,
Sept. 9, 1930.

How Building Codes Are Progressing

Sir—In your Oct. 9 issue there is an account of the headway gained in the general acceptance of the Pacific Coast Uniform Building Code. As time goes on and additions and corrections are introduced in this document, it should reflect the latest improvements in building code work and recognize the latest and most advanced methods and materials of building construction. Since there is no valid reason why building practices, particularly with respect to the necessities of public-safety matters, should not eventually become practically uniform throughout the country, those intrusted with the work of preparing building codes should study this and other recent additions to enactments on this subject. Practicing architects and engineers and contractors as well as purveyors of building materials would benefit from complete uniformity in building codes.

The most forceful influence in this respect is the building code committee of the U. S. Department of Commerce. The

reports of this committee based upon extended and painstaking research and comprise a cross-section of the thought of the nation's most progressive minds. All reports have been passed upon and edited by a group of selected men, who have labored to place before the American public the basic principles to which all building codes should conform. These men have been broadminded and not limited in their conceptions of the tasks confronting them. Their reports have been free of encumbering detail and necessarily have defined in their provisions the basic theories with which all such efforts should comply. The work of this committee deserves better recognition than has been accorded it in the past. Editors would confer a valuable service by giving more publicity to the excellent work of this committee.

The building code of Pittsburgh was the first in this country in which these scientific principles and progressive methods were applied. This building code consists of a series of minimum safe requirements or standards. The principle was kept constantly in mind that the code should be prepared and enforced as a public-safety document only, and as such should not interfere with safe and dependable practices of any kind. For this purpose basic definitions were provided and flexibility of method was permitted.

The minimum safe objectives and requirements were defined without prescribing the construction methods by which such objectives should be obtained. Thus architects and engineers are free to select the methods required according to the needs of the projects they have to execute. They are therefore limited only by the interests of the city as regards public safety.

These interests are safeguarded by requiring compliance with principles of practice recognized by competent members of the professions and by the standards of the learned societies. Means are also provided for recognition and approval of improvements in building construction. This was done by establishing a procedure and test methods according to well-recognized methods and standards. These principles have been recognized in a large measure in both the Pacific Coast and Department of Commerce building codes, and in others subsequently adopted.

The building code of Pittsburgh was prepared by a committee of architects and engineers and contractors and building owners appointed from the outstanding members of each of these professions and bodies. Architect S. F. Heckert was the chairman and the writer was the executive secretary of this committee.

JOHN A. FERGUSON,
Consulting Engineer.

Pittsburgh, Pa.
Oct. 11, 1930.

The Brothers of the Bridge

Sir—In the valuable, historical, intensely interesting and beautifully illustrated sketch of "French Pioneers in Engineering" in the issue of the *Engineering News-Record* for April 24, 1930, pp. 676 to 683, mention is made of the Frates Pontis—Brothers of the Bridge.

It should be of interest in this connection to mention further that the Frates Pontis—Brothers of the Bridge, better known as Frates Pontifices (Ponti-fices—Bridge Builders), or, in French, Les Frères Pontifices, were not real friars (brothers or monks) or members of religious orders, living under perpetual vows, for more accurate investigation has proved this idea to be erroneous. The Frates Pontifices seem to have been of the nature of guilds or confraternities, often divided into three branches—knights, who contributed funds called donati, clergy, who might be in the strict sense monks, and artizans, or the laborers who performed the actual work of building—whose members were constantly granted privileges and indulgences by the various popes of the Middle Ages. A good example is the bull of Clement III (*cf.* Jaffe, Regesta, Vol. 16, p. 132.)

The papal bull in 1191 by Clement is supposed to have been addressed to the Frates Pontifices. It is certain that a number of bridges were built in the southern part of France at this time and that the Frates Pontifices built the bridges at Bompas, Loumarin, Mallemort and Maribeau and it is also supposed the famous bridge over the Rhone at Avignon.

During the twelfth and thirteenth centuries we hear of the existence of various religious associations founded for the purpose of building bridges. This work, which tended greatly to the relief of travelers, particularly pilgrims, was regarded as a work of piety quite as much as a work of public utility.

WALTER ATLEE.

Chestertown, Md.

From One Who Does Not Wear the Blue Shield

Sir—I have noticed discussions in the Letters to the Editor referring to the wearing of the pin of the American Society of Civil Engineers and would like to enter, if it is a free fight.

I am not a member of the American Society of Civil Engineers, unfortunately for the society, but am a member of the American Institute of Mining and Metallurgical Engineers, and the fact that I am a member of any society does not make me a more competent engineer. The wearer of the pin indicates the same vanity as the peacock displaying its feathers. The best way to show real strength and be proud of the engineering profession is to support wholeheartedly legislation and other matters that are brought to the attention of engineers.

During the last year the engineer has been licked by another profession much smaller than the engineers through legislation through the courts, and when an appeal was made to the engineer to give as low as $1 toward the legal fight there was little over $1,500 collected from the entire profession of more than 10,000 registered in the state of New York. The mere wearing of the pin is not going to accomplish anything for the profession; it is coming out in answering appeals when the engineers are trampled upon through legislation and court decisions.

The architect does not wear any pins, yet in his own silent way he is able to obtain much more for his work and greater publicity for his accomplishments, and the engineer is still a mere pen pusher in the eyes of the rest of the world.

It is not a prerequisite in obtaining business that the man must be a member of the American Society of Civil Engineers; he must be an engineer, and the society or the race he belongs to should not enter into any man's livelihood, and the quicker the engineer who wears the pin realizes that he is only an engineer, if he is one by actual work performed as one, the better it will be for the entire profession.

If the lawyer, the doctor or the dentist should commit one unethical act, his professional career would cease, but the engineer is merely given an opportunity to prefer charges against an unethical engineer in the society of which the culprit is a member, and there the matter drops. The code of ethics is more important than the wearing of pins, for when not abused leads on to better things.

DAVID M. OLTARSH,
Consulting Engineer.

New York City,
Oct. 3, 1930.

Proud of His Society Pin

Sir—In spite of the objectors in your columns, I am very proud to be able to wear the pin of the American Society of Engineers and do not hesitate to call attention to the fact that I have worn the same pin for 42 years. I am entitled to wear many others, but am satisfied with one. When qualifying as an expert, I am sure that such an admission does me no harm. I have often been very glad to recognize a fellow engineer on seeing his badge, and have spoken to him, when otherwise I would have passed him by.

The only badge of which I am more proud is the (also old-fashioned) wedding ring on my wife's finger, which I placed there 42 years ago, the same year that I was admitted to the American Society of Civil Engineers.

Do not make the mistake of thinking that I am an old man, for I am not. Wearing our badge is no burden, but how about the superfluous clothing from the hat down?

As you see, I am still reading your paper, continuously, for 47 years.

T. KENWARD THOMSON,
Consulting Engineer.

New York City,
Oct. 3, 1930.

News of the Week

Dallas Adopts City Manager Government by a Vote of 2 to 1

THE city manager form of government was adopted by a 2 to 1 vote by the citizens of Dallas, Tex., at a special election held on Oct. 10. Thirty-nine propositions were submitted to the electorate and all were adopted. This has the effect of providing practically a new charter for the city, only five sections of the old instrument being retained. The city manager will be chosen next April by the city council.

The city council will consist of nine members, elected for a term of two years, six to represent districts and three at large, but the whole city will vote on each councilman. The pay for councilmen is set at $20 per meeting attended, not to exceed $1,040 a year. A mayor will be chosen by the council from among its members. He will have the same vote in the council as the other members and will have no veto power. The city manager will have the standard powers and duties of such officers in other cities.

Seven departments are created, each headed by a director appointed by the city manager. They are the departments of finance, police, fire, public works, public health, welfare and waterworks. The head of the department of public works must be an engineer and will serve as city engineer ex-officio. The public health director must be either a physician or a sanitary engineer.

A civil service commission is created, a body that has not heretofore existed in Dallas. It will consist of a board of three, appointed by the city council. In addition there will be a park board and a city planning and zoning commission, the members of which will be appointed by the council.

Dallas is the 31st city in Texas to adopt the city manager plan.

Dam Proposed for Red River in Texas

Plans are being made for the construction of a concrete dam on the Red River at a point about 5 miles from Denison, Tex. So far the plans are only tentative, but surveys have been completed. The tentative plans provide for a dam 11,000 ft. long, with a maximum height of 170 ft., forming a lake embracing 275 square miles. The estimated cost, including construction of a hydro-electric plant, is $30,000,000. The dam will be part of the national flood-control project, and will also serve to provide water for irrigating many thousand acres of land and to generate 100,00 hp. of electric current.

Engineers Appointed for Proposed Pine Canyon Dam Survey

Appointment of a consulting board to investigate safety features of the proposed Pine Canyon dam to be built on the San Gabriel River by the city of Pasadena, Calif., has been announced. The board will consist of Charles P. Berkey, geology professor, Columbia University, New York; George D. Louderback, geology professor, University of California, Berkeley; Ira A. Williams, consulting geologist, Portland, Ore.; J. L. Savage, chief designing engineer, U. S. Bureau of Reclamation, Denver, Colo.; George A. Elliott, consulting engineer, San Francisco; and M. C. Hinderlider, state engineer, Denver, Colo. The board consists of the same members who condemned the San Gabriel Canyon dam site at the Forks location.

Vernon, Calif., Votes to Build Municipal Power Plant

At a recent special election in the city of Vernon, Calif., $3,900,000 in bonds was voted to construct a municipal power plant and distribution system. Vernon is an industrial city almost wholly surrounded by the city of Los Angeles.

Mature Consideration Urged for Changes in Flood-Control Plans

THE administrative board of the American Engineering Council met Oct. 17-18 in Washington to consider committee reports, which, as usual, embraced a wide variety of topics.

A resolution was adopted reiterating the council's belief that before the major engineering features of the Mississippi flood-control project are agreed upon Major-Gen. Lytle Brown, Chief of Engineers, should have the benefit of counsel of competent civilian engineers. Declaring that some of the present expenditures, even though warranted as partial protection, may not be effective in the plan finally adopted, the resolution urged that Congress should allow General Brown ample time to perfect current studies of the problem before committing himself to a general plan.

A plan for the rectification of the Mississippi River was presented at an informal meeting of the council members by Gardner S. Williams, hydraulic engineer. Its author estimates the cost of the project at five or six times that of the Panama Canal, or presumably in the neighborhood of two billion dollars. The channel proposed extends from Cairo.

SOUTHERN PACIFIC'S NEW BRIDGE AT MARTINEZ, CALIF.

The first regular train crossing of the Southern Pacific $12,000,000 Martinez-Benicia bridge was made on Oct. 15, preliminary to the formal opening on Nov. 1. Test runs will continue to be made until the formal opening, when a regular schedule will be put into effect. This bridge will eliminate the train ferries "Solano" and "Contra Costa," long known as the world's largest ferryboats. The "Solano," commissioned in December, 1879, will end 50 years of service, while the "Contra Costa," built in 1914, ends its sixteenth year.

Ill., via Memphis, Vicksburg and Baton Rouge to deep water at St. Delphine Landing, La., about 9 miles by river below Baton Rouge. In order that the rectified channel may deliver its capacity in time of flood, an additional outlet is proposed from St. Delphine Landing by the most direct line to the Gulf of Mexico, terminating at the shore of West Cote Blanche Bay, a distance of 50 miles. The proposed plan contemplates a discharge past New Orleans of not more than 1,250,000 sec.-ft. by the old channel, equivalent to a 20-ft. stage at Carrollton; 1,750,000 sec.-ft. by the St. Delphine outlet; and 500,000 sec.-ft. from the Atchafalaya, Red and Black rivers through the new Grand Lake outlet into West Cote Blanche Bay, thus providing for a total discharge at the mouth of the Red River of 3,500,000 sec.-ft. The 1927 flood is reported to have been 2,053,000 sec.-ft.

Mr. Williams' designs contemplate a flood discharge between Cairo and the mouth of White River of 2,000,000 sec.-ft., compared with 1,800,000 sec.-ft. for the 1927 flood; between the mouth of White River and Vicksburg 2,750,000 sec.-ft., compared with 1,800,000; and from Vicksburg to Red River Landing or Angola, 3,000,000 sec.-ft., compared with 2,053,000 in 1927. The Williams plan would provide a channel depth of not less than 25 ft. to Rosedale, 376 miles from New Orleans, and 21 ft. to Cairo. The rectification suggested would reduce the distance between Cairo and New Orleans from 965 to 629 miles.

Action on Pending Legislation

On the recommendation of the committee on water resources and control the board adopted a resolution opposing the Sears and Stone bills to establish control of runoff waters as too limited in scope. Prompt publication of streamflow data by the U. S. Geological Survey was urged in a resolution similar to that previously adopted by the American Society of Civil Engineers.

Of particular interest was the bridge committee's report, submitted by H. S. Crocker, of Denver, chairman. The report presents a history of toll bridges and the legislation on this subject. A recommendation opposing the Denison bill and similar measures was adopted by the board. The committee's report states that specific objection has been made to the language or meaning of almost every section of the bill and concludes that its enactment would be injurious.

The board permitted its previous indorsement of the McNary-Haugen bill, for federal aid in the establishment of engineering experiment stations at land grant colleges, to stand, although some opposition has arisen in the form of a report by the National Advisory Committee on Education proposing that the federal government should withdraw its support from land grant colleges and other educational institutions and in lieu thereof appropriate annually to the several states $2.50 for every child under 21 years of age.

The Couzens bill, to establish a communications commission for combining the regulatory functions of the Interstate Commerce Commission and the Radio Commission over radio, telegraph, telephone and cable communication, was opposed on the recommendation of the committee on communications, although the board went on record in favor of legislation that would permit unified operation under government regulation.

The American Society of Civil Engineers, the American Society of Mechanical Engineers and the American Institute of Chemical Engineers have been requested by the council to form a joint committee to draft legislation to prohibit unnecessary pollution of waters for consideration at the annual meeting in January. The board expressed the belief that it is the function of the federal government to prevent harmful pollution of all waters under the jurisdiction of the federal and state governments, but held that the Ransdell-Hudson bill does not present the most logical or promising means of preventing pollution.

Edwin J. Prindle, chairman of the patents committee, reported that the council is gaining support from other organizations for the plan to set up a single court of patent appeals. The board indorsed the program of earthquake studies proposed by the U. S. Coast and Geodetic Survey.

W. Parker, chairman of the committee of the Washington Society of Engineers appointed to study the question of the moving expenses of engineers in government service, submitted a report recommending that both commissioner and civilian engineers be reimbursed by the government for expenses incurred in moving his family from one station to another.

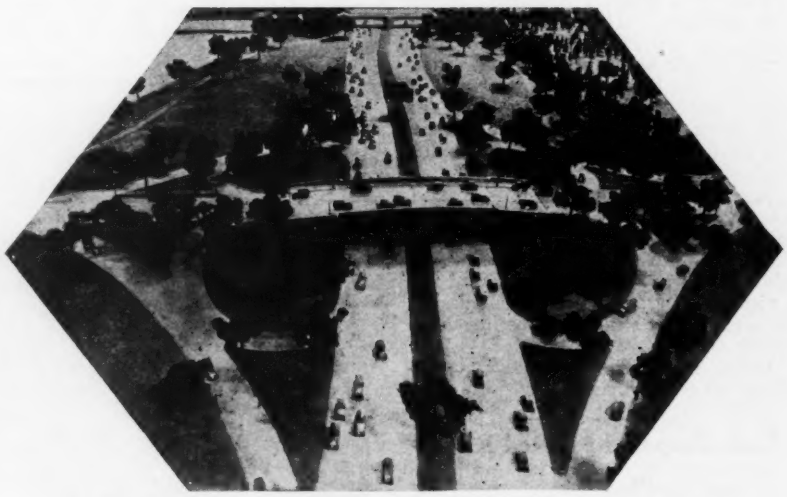
The annual meeting of the council will be held in Washington, Jan. 15-17.

John Fritz Medal Awarded to Rear Admiral Taylor

Rear Admiral David Watson Taylor, retired, chief constructor of the U. S. navy during the World War, is announced as the recipient of the John Fritz medal for 1931. This medal is awarded annnally by a committee of four members each of the four societies of American civil, mining, mechanical and electrical engineers. Among previous recipients have been Herbert Hoover, Elmer A. Sperry, Ralph Modjeski and Edward Dean Adams.

In granting the medal, the committee says it is awarded "for outstanding achievement in marine architecture, for revolutionary results of persistent research in hull design, for improvement in many types of warships and for distinguished service as chief constructor of the U. S. navy."

Admiral Taylor, as chief of the bureau of construction and repair, carried out the creation of a fleet of 800 vessels of all classes in 1918. Later he supervised the designing of the dirigible "Shenandoah."



MODEL OF MOUNT VERNON MEMORIAL HIGHWAY

The Mount Vernon memorial highway, now in the course of construction on the Virginia bank of the Potomac River, was presented in model form as an outstanding example of American highway engineering at the American Road Builders' Association Exposition, held in Washington in connection with the Sixth International Road Congress. This model, displayed by the U. S. Bureau of Public Roads, is an exact replica, on a miniature scale, of two important sections of the highway: one, at the base of the railroad and highway bridges, showing the proposed overpasses, and the other at the Mount Vernon terminus. It gives an excellent bird's-eye view of the project at these points, accurately reproducing the parking and landscaping scheme, with model trees and grass plots lining the right-of-way. Extending 15½ miles, with a minimum right-of-way of 200 ft. except through the city of Alexandria, the Mount Vernon highway will be part of the George Washington memorial parkway, a boulevard of great historic interest.

Architectural Competition for Elevated Tanks

In the belief that there are attractive architectural possibilities to be found in the natural characteristics of elevated steel tanks and that no serious thought or effort has been given to these esthetic possibilities, the officers of the Chicago Bridge & Iron Works have undertaken to sponsor a competition in the hope of securing designs for a typical tank and tower from which may be developed structures of improved appearance. For the eight most interesting designs, the following prizes have been offered: first prize, $2,000; second prize, $1,000; third prize, $500; and five honorable mention prizes of $100 each.

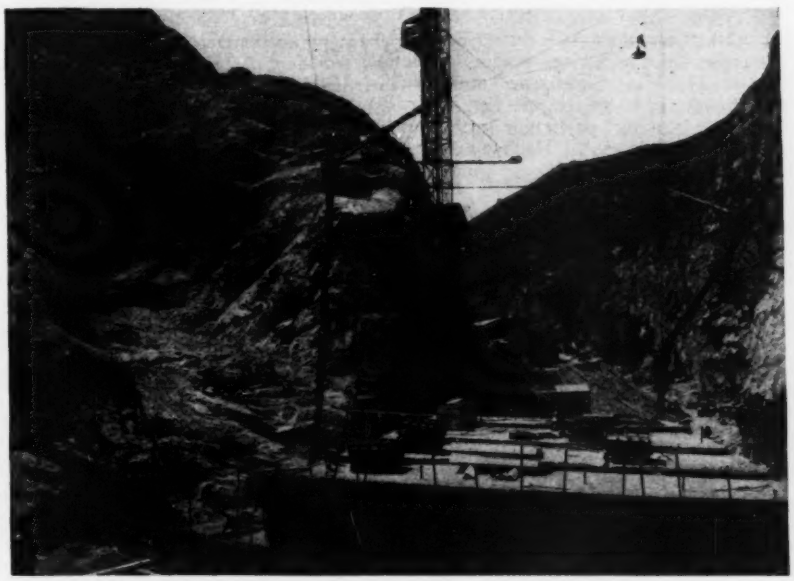
A jury of awards consisting of Howard Cheney, president of the Chicago chapter of the American Institute of Architects; R. W. Zimmerman, architect, of Chicago; and George T. Horton, president, Chicago Bridge & Iron Works, has been appointed. Albert M. Saxe, architect, Chicago, has been appointed professional adviser in the competition. Participation is open to all architects, engineers and draftsmen who make application to the professional adviser at 430 North Michigan Ave. on or before Dec. 1, 1930.

Physical requirements for the competitive tank are as follows: (1) 200,000 gal., or 26,700 cu.ft., capacity; (2) top of tank 110 ft. above ground level and the low water line, or bottom of the tank not less than 85 ft. above ground level; (3) size of riser pipe at least 5 ft. in diameter; (4) all portions of the entire tank and structure must be built of structural steel, all of which shall not be short lived either as the result of its design or the thinness of the sections.

Railroads Attack 8-Hour Day on Grade Elimination Work

Constitutionality of the New York State law compelling railroads to pay the prevailing rate of wages and observe an eight-hour day on grade-crossing elimination work was argued before Justice Staley in the state supreme court on Oct. 18. Decision was reserved.

Whatever the decision, it is expected that the case will be carried to the highest court, and until it is finally decided no new projects for grade-crossing elimination work will be undertaken. This will automatically hold up the elimination of the West Side tracks in New York City, the $32,000,000 elimination project in Syracuse, the $8,000,000 program in Elmira and completion of the work in Buffalo.



BIG TUJUNGA DAM, NEAR LOS ANGELES

On the Los Angeles County Flood Control District's Big Tujunga dam No. 1, being built at Big Tujunga Wash, 28 miles from Los Angeles, 10,150 yd. of concrete had been poured up to Oct. 1. This brought the concrete up to streambed, or to a maximum height of 40 ft. above the lowest point in the foundation. Excavation to that date totaled 57,000 yd. The dam, which is of the variable radius arch type, will have an ultimate height above streambed of 200 ft., and the ultimate height above the lowest point in the foundation will be 249 ft. As originally estimated, the final quantity of concrete will total 90,000 yd. and total excavation will be 90,000 yd. The dam is expected to be completed about June 1, 1931. E. C. Eaton is chief engineer of the Los Angeles County Flood Control District, L. C. Hill is consulting engineer, K. J. Harrison is resident engineer and R. W. Carlson is chief testing engineer. The Edwards, Wildey & Dixon Co. is the contractor.

X. H. Goodnough, Massachusetts Health Engineer, to Retire

X. Henry Goodnough, chief engineer and director of the sanitary engineering division of the Massachusetts state department of health for the past sixteen years, will retire at the end of October, it is announced. Mr. Goodnough began his services with the state in 1885, when he became connected with the Massachusetts drainage commission. In 1886 he was made assistant engineer of the state board of health under the late F. P. Stearns and when in 1895 Mr. Stearns became consulting engineer Mr. Goodnough was appointed chief engineer of the board. In 1914 he was appointed chief engineer and director of the division of sanitary engineering of the department of health and in 1926 was made consulting engineer to the metropolitan district water supply commission, which is building works to bring the water of the Ware and Swift rivers into Boston and the metropolitan district.

Mr. Goodnough will be succeeded as chief engineer by Arthur D. Weston, who has been connected with the division since 1905. Edward Wright, who has been with the department for a number of years, has been appointed sanitary engineer.

Water- and Sewage-Works Officials Hold Joint Meeting

Engineers and public officials from sixteen states in attendance at the tenth annual convention of the North Carolina section of the American Water Works Association and the eighth annual meeting of the North Carolina Sewage Works Association at Hendersonville on Oct. 13, 14 and 15 discussed with refreshing frankness in round-table talks various subjects of immediate importance in these two lines of sanitary engineering activity.

Ammonia-chlorine treatment of domestic water supplies to prevent tastes and secure more effective sterilization was extensively discussed. J. W. McAmis, superintendent of the water commission at Greenville, Tenn., who made the first practical application of this process in this country in 1926, summarized the complete satisfaction secured there in eliminating a peculiarly unpleasant chemical taste in the local raw water.

J. F. T. Berliner, of the Dupont Ammonia Corp., stated that the extension of the use of this process has been very rapid in recent months. The process was being used on Oct. 1 by 88 municipalities, compared with less than a dozen early in the year. Of the total, nine have found no particular benefit from the process, and three have experienced detrimental results. In all other instances where enough experience has been secured the results have been satisfactory. According to Dr. Berliner, the average proportion of ammonia and chlorine has worked out to be as about two to three. In some

cases a 1:1 ratio is being employed, while as low as 1:8 has been effective in one instance.

Disposal of sewage-works sludge also was reviewed at length in papers and in various discussions during the meeting. Charles C. Hommon, sanitary engineer, department of public service, Canton, Ohio, told of the satisfactory results obtained by using Imhoff tank sludge for fertilizer on a large municipal farm operated by that city. John R. Downes, supervising engineer of the sewage-treatment works at Plainfield, N. J., stated that the entire output of digested activated sludge from his plant is removed and used by a local nurseryman. E. G. McConnell, superintendent of municipal plants at Charlotte, N. C., also stated that the same type of sludge produced in that city is sold to a local fertilizer manufacturer, who processes it for sale to golf courses, by which it is in much demand.

During the meeting the close and effective co-operation among the North Carolina state department of health, the engineering schools of the state and local sanitary engineers and operating officials was mentioned several times. Mr. McConnell pointed out how H. E. Miller, chief engineer, and G. F. Catlett, principal assistant engineer of that department, have in the last ten years built up practically from a standing start a most effective public health service. In summarizing this progress Mr. McConnell called attention to the fact that in 1920 there were 132 satisfactory water supplies in the state, compared with 407 at present, with one trained operator then and 64 now. At the earlier date the state had 132 sewerage systems and no disposal plants, while there are at present 197 systems, 49 of which include disposal plants, with 11 of these in charge of trained operators.

Further indicating the effectiveness of the health service of the state, Mr. McConnell called attention to the fact that in 1917 the typhoid death rate was 36.2 per 100,000, which had been reduced to 5.2 in 1929. Based on this reduction, he estimated that more than 10,000 lives have been saved in the interval. He also stressed the fact that this and other results were largely attributable to the harmonious relations between the state and local officials involved, and they were secured in spite of inadequate legislation.

Natural Gas Transmission Pipe Line Completed in California

Completion of 750 miles of pipe line for the transmission of natural gas from the Kettleman Hills and Buttonwillow oilfields, located about 250 miles south of San Francisco, has been announced by the Pacific Gas & Electric Co. These pipe lines will serve twenty counties in central and northern California. This construction represents an investment of approximately $27,000,000.

The Business Outlook

There is a marked shortage of bear food in this week's crop of statistics, and signs multiply indicating that business as a whole is not getting worse and is making definite improvement—too slow to warrant any high hopes of quick recovery this year, but steady enough to justify those looking and planning ahead for next year. Increased consumption of electirc power in manufacturing during September, with some gain in employment and payrolls, indicates a fair seasonal resumption of industrial activity. Sharply rising orders for machine tools for the second consecutive month show that some industries, at least, think these States still have a future.

—The Business Week, Oct. 22.

Buffalo May Spend $23,000,000 for Sewers and Sewage-Works

Intercepting sewers, two sewage-treatment plants and storm relief sewers for Buffalo at a total ultimate cost of nearly $23,000,000, of which about half is for drainage, have been recommended in a report by George B. Gascoigne, consulting engineer, Cleveland, Ohio. The report is based on studies made jointly by Mr. Gascoigne and the Buffalo division of engineering, Mr. Gascoigne giving particular attention to sewage treatment. Each party to the studies concurs in the recommendation of the report.

In general, the work proposed is in line with the 1914 report and recommendations of the International Joint Commission on the Pollution of Boundary Waters. No material extensions to the main sewerage system of Buffalo have been made in the last 40 years.

Two sewage-works to serve the entire city are proposed: (1) an activated-sludge plant, with effluent discharged into the outer harbor (Lake Erie inside the breakwater) for the area designated as southeast Buffalo, with presedimentation and with separate sludge digestion and sludge drying in glass-covered beds; (2) sedimentation or fine screening with chlorination for the remaining or larger area, called North Buffalo. The preference is sedimentation. The second plant would be located on Squaw Island and the effluent would be discharged into the Niagara River, the source of water supply for a dozen downstream cities. Execution of the $23,000,000 project should be spread over ten or twelve years. The activated-sludge plant serving the southeasterly section of the city should be built before the Squaw Island treatment plant. The various intercepting sewers would serve an estimated population of 1,000,000 in 1980. The sewage-works, sufficient to 1945, would serve a total of 720,000, of which 240,000 would be tributary to the southeast, or activated-sludge, plant, and 480,000 to the North Buffalo, or sedimentation, plant. The 1930 census (preliminary announcement, dated Aug. 25) gives the population of Buffalo as 573,070.

George F. Fisk is commissioner of public works, and it was under his direction that the studies were made. William A. Rathmann is city engineer, and Carl L. Howell assistant engineer of sewerage. Acknowledgment is given by Mr. Gascoigne to them, to C. E. P. Babcock (city engineer when the studies were begun) and to Frank C. Tolles, associate of Mr. Gascoigne, who resided in Buffalo during the studies.

$3,000,000 Hydro Project for Alaska

Surveys are under way for the proposed $3,000,000 hydro-electric power project in Alaska on the west side of Portland Canal, 12 miles south of Hyder, Alaska, by the Portland Canal Power Co., Inc., of Washington, Willis T. Batcheller, Seattle engineer, president. Other members of the firm are Melvin E. Jackson, secretary-treasurer; B. J. Raymond, A. T. Brock and Edwin R. Wright, trustees. Edwin R. Wright, Hyder, is resident engineer. Initial installation, Mr. Batcheller states, will have capacity of not less than 10,000 hp. It is planned to construct an arch dam of sufficient height to produce a head of 350 ft. A power tunnel 800 ft. long and steel penstock pipes half the length will be built. The dam will create a reservoir 2 miles long.

Municipal Engineers, New Name for Public Works Body

Change of name and award of a veteran's medal for long-time service in municipal work were the outstanding points of interest at the 36th annual convention of the American Society for Municipal Improvements Oct. 13 to 17 at Richmond, Va. Although the society had a net loss of 41 members, it has lived within its income and has $4,500 in its reserve fund. One of its committees, that on rural sidewalks, obtained notice in 250 newspapers and effected passage of a law in New Jersey permitting highway funds to be diverted from pavements to sidewalks. The society has active representatives in almost every organization doing co-operative work such as the A.S.T.M. and the A.E.C. With the International Association of Street Sanitation Officials it has helped on the proposed uniform cost and record reports.

The new name is American Society of Municipal Engineers. It was adopted unanimously by the board of direction, and the convention ordered it sent to letter ballot. Reasons for the change were that the former name is too inclusive, covering non-technical officials,

whereas the membership is 93 per cent engineers and the activities of the society are predominantly engineering. The 28 state municipal leagues cover non-technical city activities. By another constitutional amendment the hereditary board of direction, which includes all the past-presidents, is to be augmented by representatives of state sections, the sections to be made up of twenty or more members.

The veteran's award, made possible by a gift from S. A. Greeley, consultant, Chicago, is intended to give formal recognition of an honorary character to engineers in city service who have served more than 25 years, are still in service and have been members of the society for at least five years. The first awards go to Robert Ridgway, in the service of New York City for 46 years; to Edward S. Rankin, in the service of Newark, N. J., for 43 years, and to John F. Skinner, in the service of Rochester, N. Y., for 39 years.

As is customary, the first vice-president, John W. Reid, consultant, Detroit, was made president and the second and third vice-presidents, J. H. Neeson, Philadelphia, and S. A. Greeley, Chicago, were moved up to first and second places. The only new name on the list is the third vice-president, A. A. Kreiger, city engineer, Louisville, Ky. S. Cameron Carson continues as treasurer. The next place of meeting will be Pittsburgh.

Eighteen exhibitors had space at the convention. The exhibits included the following: models of a proposed viaduct in Richmond and a brick pavement and intersection; asphalt, brick and concrete organization, literature and photographs; culvert pipe; instruments; park equipment, and various road materials.

Canadian Pacific Link Through Mountains Nearly Completed

One of the most difficult pieces of railway building in Canada in years is rapidly approaching an end in the near completion of a link in the Canadian Pacific south line through the heart of the Rocky Mountains. The link is between Kootenay Landing and Procter, near Nelson, B. C. It closes a gap on the line through southern British Columbia where for over 30 years connection has been made by steamer and car-barge on Kootenay Lake, transporting whole trains and ore between the east and west rail terminals.

Packard Laboratory Dedicated at Lehigh

The James Ward Packard laboratory of mechanical and electrical engineering, built with the $1,200,000 gift of the late automotive pioneer, was dedicated at Lehigh University on Oct. 15-17. This laboratory, of native sandstone with Indiana limestone trim, is 225 ft. long and 169 ft. high. Its height varies from three to five stories. The main laboratory, provided with monitor roof and traveling crane, measures 223 x63 ft. and includes two floors of these dimensions and a mezzanine floor. Extensive provision is made for classrooms, lecture rooms, research rooms and laboratory tool rooms.

A significant feature of the three-day program was an all-day symposium on the relation between the industries and the technical schools. Expressions from such men as Bancroft Gherhardi, vice-president of the American Telephone & Telegraph Co.; F. A. Merrick, president of the Westinghouse Electric & Mfg. Co.; M. S. Sloan, president of the New York Edison Co., and A. R. Glancy, president of the Oakland Motor Car Co., indicated that industry is getting results from technical graduates and is in accord with the present trend to emphasize fundamentals rather than applications. There was also a noticeable demand for greater broadening of the engineer—development of the ability to work with other men, and to appreciate beauty in literature and art.

Oregon's Governor Advised as to State's Water-Power Rights

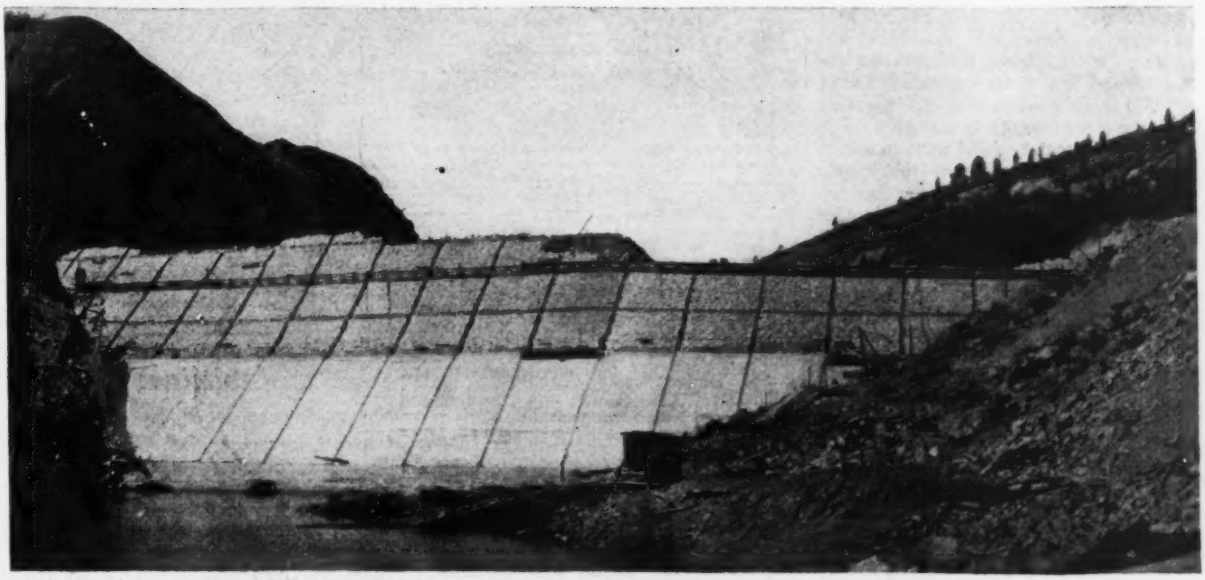
In answer to questions propounded by the governor of Oregon relative to the extent of state control of water power under the existing laws, as stated in *Engineering News-Record*, Oct. 9, p. 590, the attorney-general gives the following legal advice:

Any incorporated city or town may, by condemnation proceedings, acquire rights to water-power projects that have been constructed, and to undeveloped water rights.

The state engineer may order the cancellation of water-power permits only after applicants for such permits have been duly notified that time limits for beginning developments have lapsed and they have elected to ignore such notice.

Upon the showing of good and sufficient cause the state engineer is required by law to extend time of completion of any project.

Although the state itself is without optional privilege reserved by the federal law in connection with the recap-



PROGRESS ON SALT SPRINGS DAM IN LATE SEPTEMBER

This 328-ft. rockfill structure is being built by the Pacific Gas & Electric Co. in California. The structure as a whole is now scheduled for completion by May 1, 1931. On Oct. 1, 1930, the status of construction was reported to be as shown in the accompanying table.

Materials Required	Quantity Placed	Estimated Total Quantity
Loose rockfill, cu.yd.	2,400,000	2,650,000
Derrick-placed rock, cu.yd.	150,000	210,000
Concrete facing, cu.yd.	25,000	40,000

ture of water-power projects upon expiration of the government licenses, incorporated cities and towns may exercise the option in question.

It is the duty of the state engineer to refer all applications for water-power permits to the reclamation commission when, in his opinion, the projects under consideration are deemed prejudicial to public interest, otherwise the applications must be granted at the earliest possible date upon which proper investigations may be made.

After the state engineer has issued a permit authorizing a power company to proceed with development, the state has the power through its legislative branch by subsequent legislation to fix fees or license tax or secure a revenue from the power company for the use of the water in addition to the amount of fees required prior to such legislation.

WASHINGTON NOTES

By Paul Wooton
Washington Correspondent

Vertical and Horizontal Clearance of Bridge Over the Mississippi Is Discussed Before War Department

EFFORTS to secure approval for a vertical clearance of 112 ft. for the projected bridge over the Mississippi River 9 miles above New Orleans have apparently failed. Originally a permit was issued by the War Department approving such a clearance. The time limit prescribed in that permit lapsed and the clearance was increased to 137 ft. in the new permit.

In the discussion of the matter at a recent hearing before the War Department the horizontal clearance of 750 ft. between the central piers and for the two spans on either side was called into question. Navigation interests on the Ohio urged that a horizontal clearance of 1,000 ft. be provided to accommodate the large tows from their territory. The War Department has not announced its decision, but it is known that some revision is being made in the permit. Ralph Modjeski, engineer for the Public Belt Railway Commission, is submitting new estimates. Major-Gen. Lytle Brown, Chief of Engineers, stated that no condition would be imposed which would make the construction of the bridge prohibitive. All arrangements have been made for proceeding with construction as soon as agreement is reached on the specifications.

Another Attack on Freight Rates on Cast Iron Pipe

Freight rates on cast-iron pipe, already under attack in proceedings instituted before the Interstate Commerce Commission by the U. S. Pipe & Foundry Co. and James B. Clow & Sons, are declared to be excessive in complaints filed Oct. 16 by the Krupp Foundry Co., Lansdale and Quakertown, Pa., and the Florence Pipe Foundry & Machine Co., Florence, N. J. Both companies allege that the rates to destinations throughout official classification territory effective since March 20 last are unjust and unreasonable. Undue preference of competing foundries located at Jackson, Ohio, at Vincennes, Ind., and in the Birmingham, Ala., district is charged by Krupp. The Florence company claims that the rates are unlawfully preferential of competitors in Alabama, Ohio and the western part of Pennsylvania. The new complaints may be consolidated with those of U. S. Pipe and Clow & Sons which were heard by Examiner Wilson Sept. 4.

Alberta to Experiment With Bitumen on Graveled Highway

Possibility of widespread commercial use of bitumen extracted from the extensive bituminous sand deposits of northern Alberta looms up with the announcement of G. L. McPherson, minister of public works of Alberta, that the government will experiment with a mulch for graveled highways, made from material extracted from the sands by the process developed by Prof. K. A. Clark, of the University of Alberta. The initial experiment will be conducted on a short stretch of the Jasper highway west of the Edmonton city limits. It is hoped to perfect a treatment for the main graveled highways of Alberta, so that the highways will be rendered more durable, more lasting and more economical in maintenance costs.

Society Calendar

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS, Washington, D. C.; annual meeting, Pittsburgh, Pa., Nov. 17-20.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION, New York City: Pinehurst, N. C., Oct. 27-28.

AMERICAN IRON & STEEL INSTITUTE, New York City; semi-annual meeting, New York City, Oct. 24.

AMERICAN PUBLIC HEALTH ASSOCIATION, New York: annual meeting, Fort Worth, Tex., Oct. 27-30.

ASPHALT PAVING CONFERENCE, New York City; ninth annual conference, Memphis, Tenn., Dec. 1-5.

FLORIDA SECTION, American Society of Engineers, gave a dinner on Oct. 14 to the national president, J. F. Coleman. George T. Seabury, national secretary, and J. H. Johnston, national director, were also guests. A number of engineers from south Georgia were also present.

INTERNATIONAL ACETYLENE ASSOCIATION will hold its 31st annual convention in Chicago Nov. 12-14. The major portion of the program will be devoted to oxyacetylene welding and cutting, and special sessions have been arranged on the metal-working industry, building construction, building piping and the distribution of oil, gas and water. A. C. Morrison, 30 East 42d St., New York City, is secretary.

IOWA SEWAGE TREATMENT CONFERENCE will hold its twelfth meeting at the Iowa State College, Ames, Iowa, Nov. 13-15, in conjunction with the Iowa Wastes Disposal Association, which will have charge at one of the sessions. The other sessions will deal with (1) fundamentals of sewage treatment, (2) operators' problems, and (3) treatment plant difficulties.

NEW ENGLAND BUILDING OFFICIALS CONFERENCE will hold its fall meeting in Springfield, Mass., on Oct. 27. There will be papers and discussions on the major construction materials — steel, brick, wood and concrete.

NINTH ANNUAL ASPHALT PAVING CONFERENCE will be held at Memphis, Tenn., Dec. 1-5. Paving of the back-country macadam, gravel and dirt roads with durable, all-year, low-cost surfaces will be the principal subject of discussion. Another theme for discussion will be co-ordination of rail, water, air and highway transportation.

Personal Notes

C. C. Miller, for sixteen years city engineer of Lorain, Ohio, has been appointed chief of the engineering department of the municipal research bureau at Dayton, Ohio.

P. E. Jarman, city engineer of the city of Westmount, Quebec, since 1913, has been appointed general manager of the municipality, a post held by G. W. Thompson until his death on April 1 last. Percy G. Delgado, who has been assistant city engineer, was made city engineer.

Robert Cramer, formerly chief engineer and recently made consultant of the sewerage commission of the city of Milwaukee, Wis., has opened a consulting engineering office in that city, specializing in sewage-disposal plants and sewage systems, utilization and disposal of industrial wastes, power plants, design, construction, operation, laboratory service, valuations and reports.

Melvin L. King, architect, of Syracuse, N. Y., has been appointed a member of the Syracuse grade crossing commission to succeed Dean Louis Mitchell, of the college of applied science of Syracuse University, who resigned a few months ago. The appointment was made by the resident justices of the supreme court.

James A. O'Connor, Lewis H. Watkins, Richard Park and Daniel I. Sultan, majors of the Corps of Engineers, U. S. Army, have been promoted to the rank of lieutenant-colonel. Lieut.-Col. Sultan is now in charge of the Interoceanic Canal Survey in Nicaragua, Lieut.-Col. Watkins is engineer of the Chattanooga district, and Lieut.-Col. O'Connor and Lieut.-Col. Park are, respectively, instructor at the General Staff School and student at the War College.

Obituary

James J. Cooke, head of the J. J. Cooke Contracting Co., Denver, Colo., died on Oct. 8 at the age of 75.

George W. Caldwell, of Indianapolis, head of the contracting firm of Caldwell & Drake, died recently at his home in Indianapolis. Mr. Caldwell's company built the State Capitol buildings of West Virginia and Arkansas, many of the buildings for the St. Louis world's fair and 32 hotels in the Middle West, including the West Baden hotel. He was mayor of Indianapolis for four years.

Construction Equipment and Materials

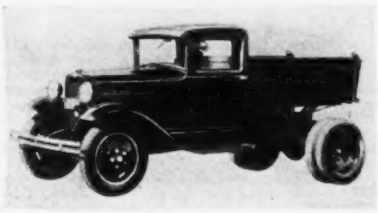
$17,500 to Be Awarded in Second Arc-Welding Competition

Announcement of the second arc-welding prize competition to be sponsored by the Lincoln Electric Co., Cleveland, Ohio, gives engineers and designers in every industry an opportunity to share in the 41 awards, ranging in size from $7,500 to $100, which will be awarded for papers describing skill and ingenuity in the utilization of arc-welded construction. Papers entered in the competition will be judged by a jury composed of members of the electrical engineering department of Ohio State University under the chairmanship of Prof. Erwin E. Dreese. The competition will be open to any person in the world except employees of the Lincoln Electric Co. and will close Oct. 1, 1931.

New Developments

New Dump Trucks Announced

The addition of five dump-body trucks to its line of standard model AA 1½-ton trucks has been announced by the Ford Motor Co., Detroit, Mich. Bodies offer

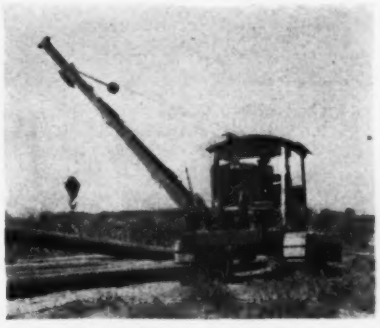


TRUCK WITH GRAVITY DUMP BODY

a wide range as to price, capacity and hoisting method, including hydraulic, mechanical, gravity and hand dump models. All bodies are made of one piece of steel, with no center or bottom seams.

Special Machine Designed for Pipe-Line Construction

Handling pipe is the specific task for which the P&H Pipe Hustler is being distributed by the Harnischfeger Sales Corp., Milwaukee, Wis. This crawler-mounted machine can be used on practically all field operations in connection with pipe-line construction, such as unloading trucks, stringing, lining and lowering long lengths of pipe into a trench. It is equipped with hoist drums on each side and in front, and a boom which can readily be moved to any one of these positions. The boom is raised and lowered by power, so that pipe can be quickly and accurately centered over the trench. In designing the machine special attention has been paid to high ground clearance and good balance. Shafts and gears are machined from high-grade alloy steel, forged and heat treated. Gears are inclosed and run in oil. Roller bearings are used throughout the main machinery. The motor is a 55-hp. Waukesha which runs at 1,000 r.p.m. Traction speed varies

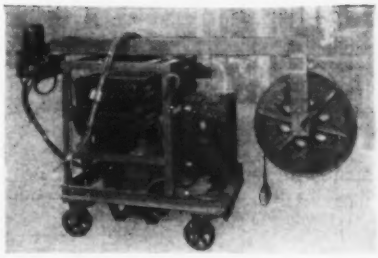


CRAWLER-MOUNTED PIPE-HANDLING MACHINE

from 1.1 to 5.2 m.p.h. Lifting capacity is 12,000 lb. at 6 ft. from the crawler edge, or 35,000 lb. with stiff-leg reinforcement and five-part line. The Pipe Hustler has a total weight of 22,500 lb., with a unit ground pressure of only 7.6 lb. per square inch.

Semi-Automatic Welder for Open or Shielded Arc

Portable semi-automatic arc-welding equipment which can be used for either open or shielded arc welding has been announced by the General Electric Co., Schenectady, N. Y. Conversion requires only the changing of two nozzle accessories. The shielded arc, which surrounds the weld with an atmosphere of hydrogen, is used to minimize the formation of harmful oxides and nitrides at the weld, producing a ductile joint.



SEMI-AUTOMATIC ARC-WELDING SET

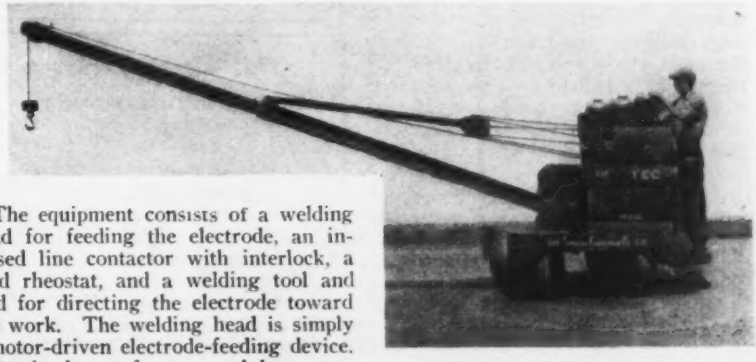
The equipment consists of a welding head for feeding the electrode, an inclosed line contactor with interlock, a field rheostat, and a welding tool and lead for directing the electrode toward the work. The welding head is simply a motor-driven electrode-feeding device. Wire is drawn from a reel by means of a pair of geared feed rollers propelled through a train of gears by an adjustable speed, 60-volt, direct-current motor. The rate of feed is controlled by a gear shift and the motor field rheostat. Although the equipment is mechanically capable of handling a ⅝-in. electrode, the manufacturer's recommendation is limited to ⅜-in. as being the largest which can conveniently be handled.

The welding tool and lead consists of a 10-ft. insulated flexible conduit with handle and nozzle so that the operator can direct the electrode at the work. A tumbler switch in the handle permits the operator to close or open the line contactor, starting the feed motor in operation. Either a constant energy or a constant potential welding set can be used as a source of welding current. The welding head control, however, will require a 60-volt constant potential source of power.

Semi-automatic arc-welding equipment is recommended for use where hand-welding equipment is too slow and full automatic apparatus cannot easily be applied.

Electrically Operated Truck Equipped as Shovel or Crane

Small electric four-wheel-drive trucks of the storage-battery type built by the Terminal Engineering Co., 17 Battery Place, New York City, are now available fitted with interchangeable auxiliary equipment, permitting their use as either shovel or crane. Both units utilize a chassis which has already been well tested in material-handling work. Because loads are carried in an overhung position, maximum counterbalance is obtained by locating the battery.

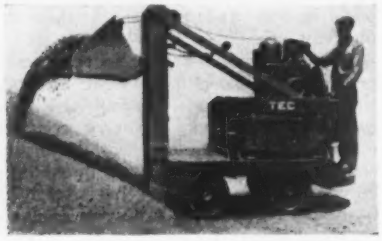


CRANE WITH TELESCOPIC BOOM EXTENDED

hoist and other equipment as far away from the load as possible. Positive traction is obtained by the four-wheel drive with a separate electric motor for each wheel. Steering, also, is through all four wheels, making it easy to maneuver the truck in cramped spaces, such as the interior of a box car. Two separate and independent sets of brakes are used, one mechanical, operating on two wheels only; the other electrical, on all four wheels.

For the shovel unit, buckets are made in various widths for handling different weights of material. A single hoist controls all movements of the bucket. The uprights on which the shovel carriage runs can be built to any desired height. An automatic stop on the up stroke speeds up operation.

The crane has a lifting capacity of 3,650 lb. at a distance of 2 ft. from the end of the chassis, or 750 lb. at a range of 14 ft. Boom lift and hoist are operated independently from two



ELECTRIC SHOVEL FOR USE IN BOX CARS

separately driven hoisting units, each with its own motor and controller. The maximum height of lift is 17½ ft. on the standard model, which has a boom telescopic over a length of 6 ft. Longer booms are available if desired.

Vacuum Pump Maintains Prime in Centrifugal Pumping Unit

Engineering refinements such as a liberal use of anti-friction bearings, the complete inclosure of all working parts, and self-oiling construction feature a self-priming centrifugal pump unit of the Humphreyes Mfg. Co., Mansfield, Ohio, which will raise from 425 to 600 gal. per minute of water against a head of 50 ft. The pump is of the open impeller type, designed primarily for self-priming service. A large vacuum pump gear-driven from the main shaft removes air from the suction line and maintains proper prime in the pump casing at all times during operation. Because of the large clearances on the open impeller type, and the fact that the priming device is entirely independent, the pump is well fitted to handle the muddy and gritty water usually encountered in construction work. It is driven either by a four-cylinder LeRoi engine developing 15 hp. or by a 15-hp. electric motor. A Twin Disc friction clutch is provided for disconnecting the vacuum pump when it is not needed. In the main pumping unit, which uses 5-in. suction and 4-in. discharge hose, the impeller shaft is supported by two heavy-duty ball bearings, both of which are outside the water pump casing and thoroughly protected against both grit and water.

Parallel Lines Evenly Spaced by Rolling Ruler

A rolling parallel ruler equipped with a micrometer measuring device is a new and useful tool for the drafting room which has been developed by

PARALLEL RULER WITH MEASURING EQUIPMENT

the Alpha Instrument Co., 2103 K St., N. W., Washington, D.C. In this instrument the shaft connecting the two grooved rollers which make contact with the drawing is geared to a rotating dial indicator, shown at the right in the illustration. On the rim of this dial is mounted an adjustable zero point to obviate the necessity of making a preliminary setting. For finer measurements there is an auxiliary dial mounted on a cross-shaft connected with the main shaft by a worm gear. This worm can be easily disengaged, allowing the instrument to move freely.

Particularly adapted for the quick and accurate spacing of parallel lines, the ruler can also be used as a measuring instrument. The manufacturers state that with ordinary care in operation, measurements can be made with an accuracy well within 0.001 in.

Cost and Contracts

E. N.-R. Index Numbers

Cost		Volume	
Oct. 1, 1930	198.72	Sept., 1930	232
Sept. 1, 1930	199.58	August, 1930	259
Oct. 1, 1929	206.32	Sept., 1929	340
Average, 1929	207.02	Average, 1929	317
Average, 1928	206.78	Average, 1928	287
1913	100.00	1913	100

This Week's Contracts

Heavy construction contracts, reported by *Engineering News-Record* in the week of Oct. 23, with some comparisons, total as follows:

(In Thousands of Dollars)

	Oct. 23, 1930	Average of Last Four Weeks 1930	1929
Buildings:			
Industrial	$4,995	$5,139	$5,645
Other	29,226	23,380	30,692
Streets and roads..	10,961	9,908	11,355
Other eng. constr..	13,744	11,050	10,560
Total	$58,926	$49,478	$58,254

Total, all classes Jan. 1 to Oct. 23:

1930	$2,765,985
1929	3,454,521

Business Notes

A PROPOSED American standard for pipe plugs of cast iron, malleable iron, cast steel and forged steel is now being distributed in tentative form for criticism and comment. Copies can be obtained from C. B. LePage, assistant secretary, A.S.M.E., 29 West 29th St., New York City.

SOUTHWEST ROAD SHOW AND SCHOOL, an annual event, is to be held at Wichita, Kan., Feb. 24-27, 1931.

WILSON WELDER & METALS CO., INC., Newark, N. J., recently moved into a new plant erected by the arc-welding method.

NATIONAL LUMBER MANUFACTURERS ASSOCIATION, Washington, D. C., has appointed Erhardt C. Koerper a member of its staff to succeed the late Joseph P. Quinlan.

AMERICAN HOIST & DERRICK CO., St. Paul, Minn., has moved its Dayton, Ohio, office to 703 New City Building, Indianapolis, Ind.

LECOURTENAY CO., Newark, N. J., has appointed F. J. Moran district manager at Philadelphia, Pa.

AMERICAN CAST IRON PIPE CO., Birmingham, Ala., is celebrating the 25th anniversary of the founding of the company.

LINCOLN ELECTRIC CO., Cleveland, Ohio, has appointed W. S. Stewart, formerly in charge of Pacific Coast offices of the company, district manager in charge of the Cleveland territory.

CONSTRUCTION MACHINERY CO., Waterloo, Iowa, has entered into an agreement with the L. & P. Mfg. Co., Niagara Falls, Ont., for the manufacture of Wonder and Marsh-Capron concrete mixers for distribution in Canada.

POWER MFG. CO., Marion, Ohio, has created a number of regional sales districts in charge of representatives from the home office. Sales of Victor diesel-type engines will hereafter be handled through these offices, located at Marion, Ohio (two offices), Memphis, Tenn., Dallas, Tex., and San Francisco, Calif.

R. C. STANHOPE, formerly supervisor of equipment for the U.G.I. Contracting Co., manager of surplus equipment for United Engineers & Constructors, Inc., and general manager of the Mid-Continent Equipment & Machinery Co., has opened an office for the sale of a complete line of contractors' equipment at 101 West 31st St., New York City.

AMERICAN ROLLING MILL CO., Middletown, Ohio, has organized a new division of its sales forces, the railroad division, which will combine the handling of wrought steel wheels, iron and steel sheets and various other products. Headquarters will be in Middletown. Logan T. Johnston is manager of the division and H. M. Arrick assistant manager. C. G. Bacon is director of wheel research. Three district offices have been established, at New York, Chicago and St. Louis.

UTILITIES EQUIPMENT CORP., LTD., Los Angeles, Calif., has taken over Jones-Lyman & Co., Inc.

DOMESTIC ELECTRIC CO., Kent, Ohio, which was acquired by the Black & Decker Electric Co. two years ago, has changed its name to Black & Decker Electric Co.

TRUSCON STEEL CO., Youngstown, Ohio, has engaged Wharton Clay to help extend professional and trade contacts and to develop fields for the application of new ideas in up-to-date merchandising.

ST. JOHN X-RAY SERVICE CORP., 505 Fifth Ave., New York City, has arranged with the Westinghouse X-Ray Co., Inc., to sell Westinghouse equipment in industrial fields.

WORTHINGTON PUMP & MACHINERY CORP., New York City, has acquired the Gilman Manufacturing Co., East Boston, Mass. By this action the Worthington company takes over the manufacture and distribution of an entire line of compressed air tools and accessories.

PORTER-CABLE-HUTCHINSON CORP., Syracuse, N. Y., has been formed by consolidation of the Porter-Cable Machine Co., Syracuse, and the Hutchinson Mfg. Co., of Norristown, Pa. Manufacture of woodworking machinery will be continued at both Syracuse and Norristown plants. Sales agencies will be consolidated.

INTERNATIONAL BITUMEN CO., LTD., Edmondton, Alta., Canada, after devoting three years to the development of a process for the extraction of superfluous sand and water from its bituminous deposits in Canada, has made an initial shipment of 207 bbl. of commercially pure bitumen.

Unit Prices From Current Construction Bids

Changing Chartiers Creek Channel, Allegheny County, Pa.

CHARTIERS Creek in Allegheny County, Pa., is being relocated on state highway route 108. Work consists of digging a new channel in the vicinity of bridges 19 and 22, building a reinforced-concrete culvert at the site of bridge 22, constructing embankments at the sites of these bridges, and disposing of materials, including the bridges. Contract was awarded early in July, 1930, for $177,175 and will be completed in November.

The largest item (2) is excavation for channel change, and amounts to 77 per cent of total cost. It includes filling in two areas with 35,000 cu.yd. and making two embankments of 20,000 and 16,000 cu.yd. at the bridges. A lump-sum price covers removal of the bridges. Certain of the materials claimed by the county were loaded on the cars and shipped prepaid to Parkview. These consisted of traffic plates, floorbeams and stringers. The remainder of the material, including abutment masonry to 4 ft. below the new grade of route 108 and the piers to ground or water level, was removed from the job.

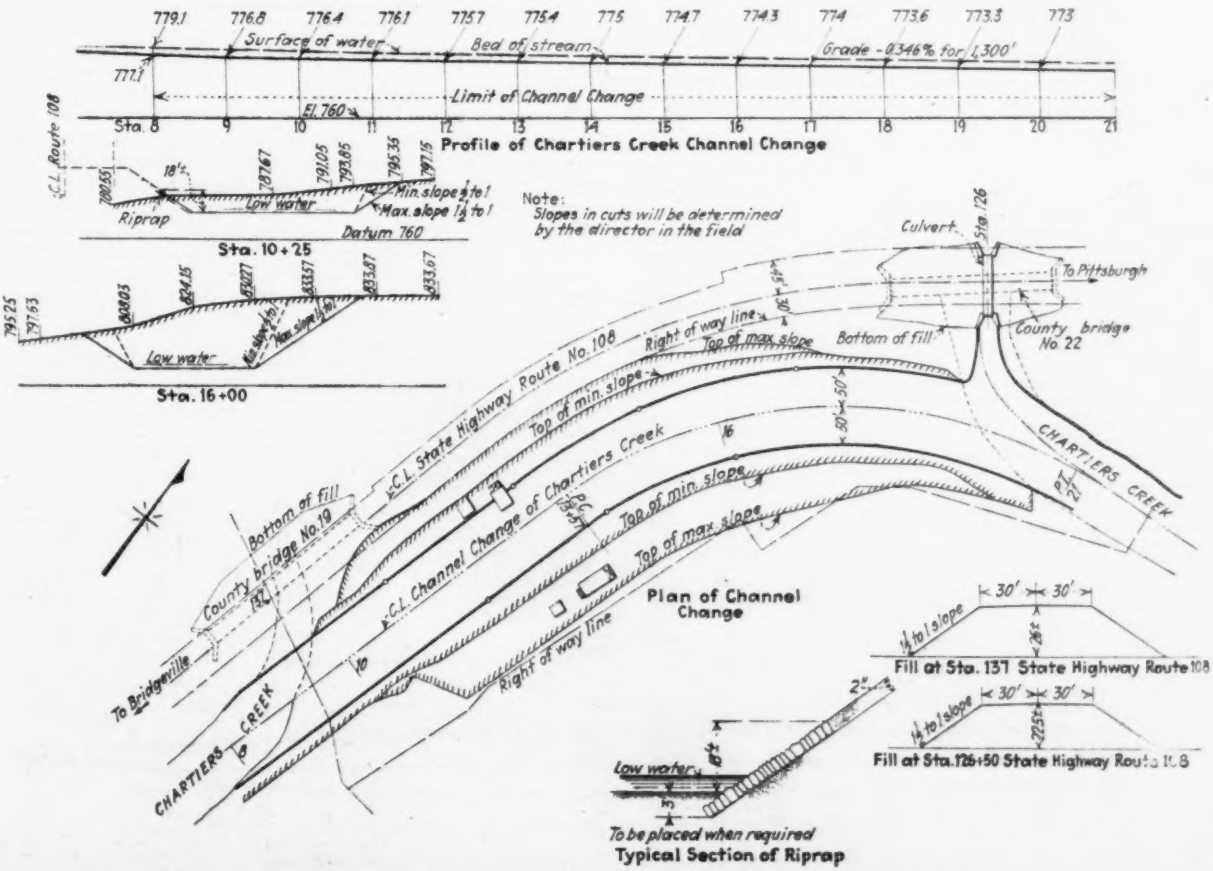
Slopes of the embankments placed at the bridge sites, facing the new channel, are riprapped 2 ft. thick from toe to high-water line with stone obtained from excavation or bridge foundations. The culvert is 12¼x12¼ ft. by 82 ft. long with 18½-ft. wingwalls at each end. The structure is thoroughly waterproofed.

Ten bids were received. Unit prices are given of the lowest two and the average of the ten. A and B are, respectively, S. T. Brotmarkle & Sons, 2219 Brownsville Ave., and the Dravo Contracting Co., both of Pittsburgh.

		A	B	Avg. 10 Bids
1.	240 cu.yd. excav. for foundations	$3 00	$3 00	$4 28
2.	290,000 cu.yd. excav. for channel change	47	25	51
3.	60 cu.yd. conc. in toe walls	17 50	20 00	16 85
4.	50 cu.yd. conc. in foundation of wingwalls	17 50	20 00	17 95
5.	450 cu.yd. conc. not included in items 3 and 4	17 50	20 00	18 35
6.	30 cu.yd. stone drains	3 00	1 60	3 19
7.	80,000 lb. steel reinf. and dowels	05	03	04
8.	50 bbl. extra portland cement	3 00	2 00	2 56
9.	560 cu.yd. conc. admixtures	25	20	29
10.	730 sq.yd. tar waterproofing	50	1 00	61
11.	Removal and disposal of existing bridges Nos. 19 and 22	500 00	3,500 00	.....
12.	5,500 cu.yd. riprap	4 00	1 00	3 36
16.	600 lin.ft. test borings	2 50	2 00	2 40
17.	Installation and removal of tools, plant and equipment (lump sum)	1,500 00	6,400 00	.....
	Totals	$177,165	$193,513	

Bascule Bridge in Baltimore

PENNINGTON AVE. bridge in Baltimore, south of a present small trestle bridge having a swing drawspan, consists of fill partly on land but chiefly in water, a double bascule span of 150-ft. width of opening, and approach spans connecting fills with bascule. It is 874 ft. long. The bascule span is steel, with a wood and asphalt lumber roadway with footway on each side resting on piers sunk by open coffer-


Profile of Chartiers Creek Channel Change
Surface of water
Bed of stream
Grade -0.346% for 1,300'
Limit of Channel Change
El. 760
Sta. 8
Sta. 10+25
Sta. 16+00
Riprap
Low water
Min. slope ½ to 1
Max. slope 1½ to 1
Datum 760
Note: Slopes in cuts will be determined by the director in the field
Plan of Channel Change
C.L. State Highway Route No. 108
C.L. Channel Change of Chartiers Creek
Top of min. slope
Top of max. slope
Right of way line
Bottom of fill
County bridge No. 19
County bridge No. 22
Culvert
To Pittsburgh
To Bridgeville
CHARTIERS CREEK
Fill at Sta. 137 State Highway Route 108
Fill at Sta. 126+50 State Highway Route 108
Typical Section of Riprap
To be placed when required

PLAN OF CHARTIERS CREEK CHANNEL CHANGE AND TYPICAL SECTIONS OF CUTS AND FILLS

Unit Prices From Current Construction Bids

dam with tremie concrete to El. —20 and unwatered above that elevation. Approach spans have a 40-ft. roadway of reinforced concrete on steel stringers, and 6-ft. footways with reinforced-concrete handrail; they are carried by two flared-base steel cylinders on timber piles. All stringers and floorbeams, except on the bascule span, are protected with concrete or cement-mortar covering. At the approach piers and west abutment, the creek bottom is to be dredged and the mud replaced with sand in order to afford additional stability.

The first six items are lump-sum bids. Item 1 is for all approach-span work, except concrete fill in car track trough, including timber work except piles. Item 2 is for work in the bascule piers above El. —20 M.L.T., including roadway and footway slabs, concrete handrails, walls, and all other concrete work except counterweight and operators' houses. Item 3 is for two operators' houses, complete except wiring. Item 4 is the superstructure of the bascule span complete, including electrical work, operating equipment, traffic gates, steelwork, counterweight, flooring, handrail, roadway and footway, but not including furnishing and placing railway tracks or trolley poles. Item 5 is for the fender system of creosoted timber, complete except piles but including pile fastenings. Item 6 is for keeping traffic and navigation open, tearing out portions of old bridge, and operating bascule and scow pontoons until the bridge is accepted. The thirteen other items have unit prices.

During the construction, the contractor co-operates with the Consolidated Gas, Electric Light & Power Co., which lays a 10-in. gas main under the roadway; with the Chesapeake & Potomac Telephone Co., which lays a duct; the Electrical-Mechanical Bureau, which lays a conduit; the United Railway & Electric Co., which may lay tracks and place trolley poles and wires. Clear opening through both old and new bridges must be maintained, and traffic on the old bridge interfered with as little as possible. When the bascule span has been erected and navigation opened, piers 5 and 6 and spans 4-5, 5-6, 6-WB are erected. The old draw is then opened permanently, and a lane of traffic is kept open on the old bridge by means of a pontoon with movable apron approaches. The pontoon is moved by tug or other power and is operated by the contractor.

The portion from the west abutment to the west shore of Curtis Creek is filled with sand, gravel, clay or other materials that will pack and form a stable roadway. This fill is made by dumping from trucks from the creek bank out to the abutment or by dredging from the adjacent bottom of the creek. The first operation is to fill behind and around the west abutment. The procedure is the same at the east abutment.

	A	B
Approach spans–lump sum	$187,700	$187,835
Bascule piers above —20–lump sum	75,000	48,000
Operators' houses–lump sum	7,000	8,000
Superstructure bascule–lump sum	187,600	235,500
Fenders–lump sum	3,300	4,000
Traffic and navigation–lump sum	7,000	25,000
Excavation to dump–6,200 cu.yd.	5.50	1.00
Excavating abutment–70 cu.yd.	5.00	3.00
Excavating bascule–4,960 cu.yd.	.75	2.00
Fill from pits–72,100 cu.yd.	.35	.70
Fill from scows–13,800 cu.yd.	.55	1.25
Piles–36,200 lin.ft.	.60	.60
Creosoted piles–7,900 lin.ft.	1.10	1.00
Sheetpiles–10,600 lin.ft.	.72	.75
Concreting cylinder below + 1.0–1,600 cu.yd.	34.00	20.00
Concreting bascule below —2.0–7,150 cu.yd.	9.60	8.00
Concreting track trough–550 cu.yd.	8.20	8.00
Reinforcing steel below + 1.0–60,000 lb.	.05	.05
Riprap–200 tons	4.00	5.00
Total	$676,987	$727,555

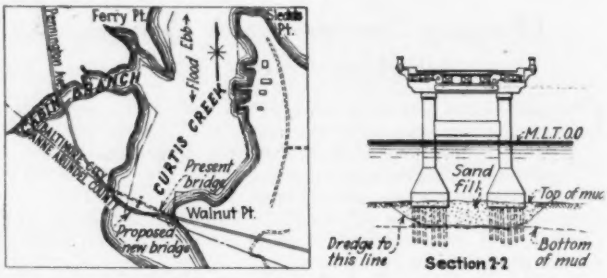


FIG. 2—LOCATION PLAN AND SECTION OF APPROACH

The standard concrete mix is 1 cement and 6 of coarse and fine aggregate; for handrail, 1 to 4. Slump for massive sections is 1 to 4 in.; for slabs, beams and girders, 3 to 5 in., except for restricted sections, where it is 4 to 6 in.

Five bids were received, averaging $798,000. Lump sum and unit prices are given of the lowest two bidders: A, Sanford & Brooks (award), Canton House, Baltimore; B, Triest & Earle Corp. Henry G. Perring, Court Square Bldg., is consulting engineer.

Dredging the Upper Hudson River

AWARD of a contract has been made by the U. S. government to the Great Lakes Dredge & Dock Co. for the dredging and removal of 62,900 cu.yd. of soft material and 200,600 cu.yd. of ledge rock from the Hudson River at Mulls, N. Y., 11 miles south of Albany, N. Y. The contract price is a flat rate of $1.47 for any class of material encountered. The area is 3,550 ft. long and 200 ft. bottom width, and the material to be removed to a level 27 ft. below mean low water. Least known depth is 13 ft., and average depth of cut is 8.4 ft. This contract is part of a project for which $4,465,000 has been appropriated.

Work commences at once and completion is within 600 days. The river is subject to freshets in the spring and is usually closed by ice between Dec. 15 and April 1. Mean tidal range at Mulls is 3.1 ft., and maximum tidal current is 3 ft. per second at normal stages.

Five bids received Sept. 2, 1930, and the engineer's estimate are given below.

	62,900 Cu.Yd. Not Ledge Rock	200,600 Cu.Yd. Ledge Rock	Total Price
Great Lakes Dredge & Dock	$1.479	$1.479	$389,717
United Dredging	.50	2.10	452,710
Arundel	.39	2.36	494,947
Dunbar & Sullivan	.49	2.49	530,315
Eugene Breymann	.77	3.97	844,815

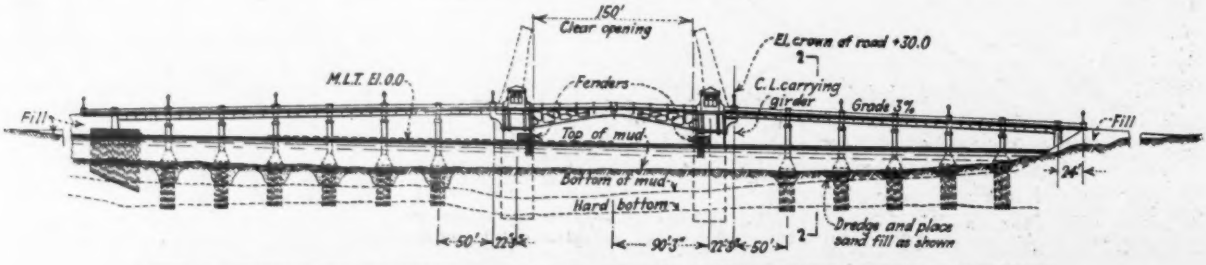


FIG. 1—ELEVATION OF PENNINGTON AVE. BRIDGE OVER CURTIS CREEK, BALTIMORE

CONSTRUCTION NEWS

Some of the Week's Large Projects

For further details turn to the appropriate sections in this issue.

Location	Project	Cost	Status
Waterworks			
Ft. Wayne (Ind.)	Waterworks	$2,000,000	Proposed
Beaumont (Tex.)	Waterworks	1,400,000	Proposed
Sewers			
Chicago	Sewer	2,500,000	Bids asked
Grade Elimination			
Toronto	Grade Separation, etc.	1,500,000	Proposed
Excav. Dredging			
Montreal	Harbor Improvements	2,000,000	Proposed
Dams			
Roseland (B.C.)	Dam	3,000,000	Proposed
Shops and Foundries			
Pittsfield (Mass.)	Tank Shop	1,000,000	Bids asked
Warehouses			
New York	Warehouse	1,500,000	Bids asked
Factories and Mills			
Neville Island (Pa.)	Refinery	1,500,000	Contract
Buildings			
Englewood (N.J.)	Apartment	2,600,000	Sep. Con.
New York	Apartment	1,500,000	Contract
White Plains (N.Y.)	Hospital	1,250,000	Contract
Kerrville (Tex.)	Sanatorium and Hotel	1,950,000	Proposed
San Francisco	Office	1,750,000	Contract
New York	Office	1,000,000	Proposed
Toronto	Office	1,000,000	Proposed
Beverly Hills (Calif.)	City Hall and Library	1,000,000	Proposed
Los Angeles	Court House	5,000,000	Proposed
Pasadena	Auditorium	1,000,000	Bids asked
Billerica (Mass.)	House of Correction	1,000,000	Bids asked
Bloomington (Ind.)	University	1,000,000	Proposed
Gary (Ind.)	High School	1,000,000	Bids asked
San Francisco	College	6,000,000	Proposed
Perth Amboy	Theatre	1,000,000	Bids asked

WATERWORKS

PROPOSED WORK

Calif., Los Angeles — City Harbor Comm., rejected bids Sept. 10, syphon, pumping equipment, motors, pipe all in connection with Fish Harbor Salt Water Supply Line.

Calif., Palo Alto—Santa Clara Co. forming water district to finance construction distributing system in district south of city. $30,000 or more.

Calif., Stratford — Bd. Directors Stratford Public Utility Dist. bids withdrawn to have been opened about Oct. 14, waterworks improvements. J. B. Benedict, Hanford, engr. Noted Oct. 1.

Ill., Colchester — For 75,000 gal. tank on tower, brick pump house, 2 centrifugal pumps, 50,000 gal. clear well, chlorinator, 43,040 ft. 4- to 8-in. c.i. pipe, 61 valves and boxes. Election Oct. 28, $80,000, for same. W. A. Fuller Co., 2916 Shenandoah Ave., St. Louis, Mo., engrs.

Ind., Ft. Wayne—Waterworks improvements, incl. filtration plant, aqueduct to divert water in city mains, increased to 24 m.g.p.d., damming St. Josephs River. $2,500,000. Hood, Becker, Shoecraft & Drury, Ann Harbor, Mich., engrs.

Mich., St. Joseph—Gordon & Bulot, engrs., 53 West Jackson Blvd., Chicago, Ill., preparing report on waterworks, for City.

N. J., Elizabeth—Bd. City Comrs., City Hall, water line from southern part Newark to corner of North Broad and Prince Sts., here. $300,000. T. Collins, city engr. Noted Oct. 16.

O., Youngstown — Extending waterworks. $400,000. W. H. Dittoe, Youngstown, engr.

Pa., Ridgway — Boro, G. F. Greiner, secy., waterworks improvements, extensions, reconstructing dam, installing new 20 in. main, new pump. C. Keeler Gifford, Ridgway, engr. Election Nov. 4 to vote on bonds for same.

Tenn., Johnson City — City, W. B. Ellison, mayor, temporarily postponed waterworks project, incl. 2 m.g. steel reservoir. J. B. McCrary Eng. Co., Citizens & Savings Bank Bldg., Atlanta, Ga., engrs. Noted July 31.

Tex., Albany — City, c/o A. Webb, mayor, waterworks, dam sites to be selected soon. $250,000. P. K. Clark & J. E. Pirie, Albany, consult. engrs.

Tex., Beaumont — City, Hawley, Freese & Nichols, engrs., Capps Bldg., Fort Worth, and 303 Frost Bldg., San Antonio, made report and recommend waterworks improvements, incl. considerable amount main pipe, pumping equipment, probably huge retaining reservoir. $1,400,000 bond election planned for same.

Tex., College Station—A. and M. College, c/o B. D. Marburger, supt. utilities, wants prices f.o.b. College Station, one motor driven centrifugal pump for water supply to elevated tower, 1,000 g.p.m. against combined total head of 240 ft., suction head 15 ft., motor for three-phase current, 60 cycle, 2,300 volts, starting compensator to be G. E. type, C. R. 1034. Bids wanted with and without motor.

B. C., West Vancouver—Municipality plans improving waterworks, incl. 14 in. main, automatic pump, 8 in. c.i. mains. $165,000 bonds voted. Work probably by force account. J. Duncan, Municipal Bldg., engr. Noted Sept. 26 Daily.

Ont., Hamilton—W. McFaul, city engr., preparing plans waterworks reservoir on Mountain Ave., $565,000; Main St. Sewer, $25,000; repairing, cleaning Mountain Drain, $65,000; Burlington St. Sewer, $42,300.

Ont., Toronto—York Twp. Council, 4 mi. 6 in. c.i. mains, valves, hydrants. $84,750. F. B. Goedike, 40 Jarvis St., engr.

BIDS ASKED

Calif., Los Angeles—Oct. 27, by Bd. Supervs. Los Angeles Co., drilling 23 diamond drill holes at site San Gabriel Dam 1, 600 lin.ft. holes in river wash, gravel and boulders, 600 lin.ft. holes in bedrock and 50 lin.ft. holes in any material, all 100 ft. in depth, casings withdrawn from holes, or casings left in place incl. cost of casings, all casings to be 2 in. or 3 in. diam.; exploration tunnels for San Gabriel Dam 1, 725 ft. driving 16 tunnels, more or less, without timbering, and 75 ft. driving 16 tunnels, more or less, incl. excav. and timbering costs.

Calif., San Francisco — Oct. 29, by S. J. Hester, secy. Bd. P. Wks., 12 mi. pipe line, incl. 25,000 ft. 24 in. and 32,000 ft. 36 in. riveted, lockbar or welded pipe, in connection with Hetch Hetchy Project, Contr. 122, for City and San Francisco Co. $800,000. M. M. O'Shaughnessy, city engr.

La., Kenner—Oct. 29, by City, East Jefferson Water Dist. 1, river intake works. Contr. 11. H. A. Mentz & Co., Hammond, engrs.

N. J., Essex Fells—Oct. 27, by Boro Council, Boro Hall, watermain in Fells Rd. between Hillbury and Oldchester Rds. $15,000. C. H. Capen, Jr., boro engr.

N. J., Ventnor—Oct. 27, by Bd. City Council, City Hall, 300,000 gal. elevated steel tank, 122 ft. high for water storage. To exceed $15,000. Former bids rejected. E. D. Rightmire, 530 Guarantee Trust Bldg., Atlantic City, city engr. Noted Oct. 29.

N. Y., Brooklyn—Oct. 28, by J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, mains in Herkimer and St. Johns Pls., Bedford, Waverly, Jefferson and New York Aves., Himrod, Pacific, Corona, Powell, North 9th, Herkimer and 18th Sts.

N. Y., Long Island City—Oct. 28, by J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, mains in 60th Pl., 63rd Dr., Chevy Chase Rd., Woodhaven, Northern and Willetts Point Blvds., Corona, 52nd, 68th and 46th Aves., 61st, 83rd, 110th, Cleveland and 65th Sts., Queens Boro.

N. Y., New York—Oct. 28, by J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., mains in Grand Concourse and Boulevard, Eastern Blvd., Osborne and Sound View Pls., Amundson, Arlington, Boyd, Bruner, Byron, Fenton, Jerome, Matthews, Norton, Paulding, Richardson, Wallace, Waring, William, and Zerega Aves., Hicks, Truxton, East 211th and West 260th Sts., Bronx Boro.

Tex., Port Arthur—Nov. 11 by City, c/o J. W. O'Neal, mayor, 2 new pump houses, and altering present buildings. $120,000. J. B. Converse, Port Arthur, engr. Noted Oct. 16.

Ont., Niagara Falls—Oct. 31, by W. A. McDowell, secy.-treas. Bd. Water Comrs., three 360 kva transformers and 7,000 gal. storage tank for filtration plant and pumping station at Chippawa. H. G. Acres & Co. Ltd., Ferry St., consult. engrs.

Ont., Westboro—Nov. 8, by J. Gamble, clk. Nepean Twp., main section waterworks, in Nepean Twp., $240,000, of this amount $65,000 is for water services, and $175,000 for sewers. James, Proctor & Redfern, Ltd., 1104 Excelsior Life Bldg., Toronto, consult. engrs.

Ont., Whitby—See "Contracts Awarded."

CONTRACTS AWARDED

Calif., Compton—See "Streets and Roads."

Calif., Long Beach—See "Streets and Roads."

Calif., Los Angeles—For 4,752 ft. 20 in. c.i. water pipe, f.o.b. Hewitt St. Yard and 4,308 ft. 24 in., f.o.b. trenchside, to National Cast Iron Pipe Co., 846 South Bway., at $3.68 and $4.91 per ft. respectively; 5,760 ft. 16 in., f.o.b. trenchsides, and 9,120 ft. 16 in., f.o.b. Slawson and Compton Yard, to United States Pipe & Fdry. Co., Los Angeles, at $2.90 and $2.53 per ft. respectively; 11,316 ft., f.o.b. Slawson and Compton Yard, to American Cast Iron Pipe Co., 412 West 6th St., $4.90.

Calif., Oakland—J. H. Kimball, secy. East Bay Municipal Utilities Dist., to Pacific States Cast Iron Pipe Co., 111 Sutter St., San Francisco, 15,000 ft. 4 in. Class 150 c.i. pipe at $0.35 per lin.ft.; to United States Cast Iron Pipe & Fdry. Co., Monadnock Bldg., San Francisco, 25,000 ft. 6 in. Class 250 c.i. pipe $0.59, 17,000 ft. 8 in. $0.89, 616 tons 12 in. Class B c.i. pipe $38.70 per ton, 437 tons 16 in. $39.70. Noted Sept. 11.

Conn., Torrington — Torrington Water Co., 2,000 ft. concrete reservoir dam, 45 ft. high, at Hart Hollow, to Torrington Building Co., 182 Church St. Est. exceeds $15,000. Noted July 24.

Ill., Chicago—Bd. Local Impvts., City Hall, c.i. water supply pipes, castings, c.i. fire hydrants, valves, brick valve basins in West 60th and 63rd Sts., South Normandy, South Natoma, South Nashville, South Neenah, South Natchez, Hamlet, South Kolin and South Paxton Aves., to M. J. Bohan, 1105 West Garfield Blvd.; West 79th St., Highland, Lambert, South Homan, Turner, South Spaulding and South Sawyer Aves., to S. Ryan, 2927 West Congress St.; water service pipes in Roscoe St., Nordica, Newport and North Hamilton Aves., to Washington Plumbing & Heating Co., 461 North Halsted St.; West 129 Pl., Paxton Ave., South Green and South Peoria Sts., to P. J. Collins Co., 5521 Bway. Noted Oct. 2.

Ill., Lewistown—S. Campbell, city clk., 4,450 ft. 4 in. c.i. pipe, 2,600 lb. c.i. special castings, 5 double nozzle fire hydrants, six 4 in. gate valves and boxes, 5 cut-ins complete on old distribution system, 3 cut-ins (plug removed only), to G. L. Dunbar, 7514 Buckingham Dr., Clayton, Mo., $4,521. Noted Sept. 25.

See proposal advertising on page 93

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LEADITE

Trade Mark Registered U.S. Pat. Office

Over a QUARTER CENTURY'S successful use

First and foremost, LEADITE makes a good, tight joint,—and, it "speeds-up" bell and spigot pipe laying, thereby helping to make the water line a revenue producer, well within the specified time allowance.

Water Works Men most everywhere have used LEADITE for many years under varying conditions and pressures—for jointing bell and spigot water mains from 4 in. to 84 in. diameter, and for various pressures.

The Pioneer self-caulking material for c. i. pipe.
Tested and used for over 30 years.
Saves at least 75%

THE LEADITE COMPANY
Land Title Building Philadelphia, Pa

No Caulking

Waterworks (Continued)

Mass., Montague — Keith Paper Co., A. Dunbar, mgr., Turners Falls, 1 story water treatment plant, to G. H. Reed, 24 Franklin St., Greenfield. Est. $40,000-$50,000.

Mich., Detroit — Dpt. Water Supply, setting two 1,000 hp. steam boilers at Springwells Pumping Station, to Lyons & Long, 1170 Oakman Blvd., $19,980.

Mont., Great Falls—City, installing 20 in. c.i. mains in 1st Ave. N and Park Dr., to McGuire & Blakesley, Great Falls, $35,005.

Mo., Lamar—City, waterworks improvements, to Standard Paving Co., 2119 East 11th St., Tulsa, Okla., $25,530. Noted Oct. 2.

Neb., Hastings—City, 2 story, 62 x 82 ft., brick, concrete stone addition to water and light plant building, North Hastings Ave., to E. Ellis, St. Joe and South Sts. Est. $20,000.

N. J., Florence—Twp. excavating, laying new water lines, to A. Ellis, Moorestown, $30,000.

N. Y., Brooklyn—J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, mains in Kings Highway, Linden Blvd., Fort Hamilton Parkway, Lott and Banner Aves., to Draganetti Contg. Co., 711 East 228th St., New York, $8,970. Noted Oct. 2.

N. Y., Brooklyn—New York Water Serv. Co., W. R. Edwards, pres., 27 William St., New York, artesian well, to Guaranteed Water Eng. Co., 420 Lexington Ave., New York. Noted Oct. 9.

N. Y., Long Island City—J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, mains in 31st Ave., to Gregory Contg. Co., 351 E. 124th St., New York, $3,720. Noted Oct. 2.

N. Y., New York—J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., removing, resetting low and high pressure fire hydrants, appurtenances in 2nd Ave., Broome, Chrystie, Forsythe, Grand and Hester Sts., to F. N. Lewis Co., Eastern Blvd. and East 177th St., $13,554. Noted Oct. 2.

Ont., Whitby—Town, 1 mi. 6 in. c.i. mains, valves, house services, hydrants, day labor, $15,000. H. L. Pringle, city engr.

SEWERS

PROPOSED WORK

Calif., Los Angeles—Los Angeles Co. Sanitation Dist. 8, rejected bids Grace Street Trunk Sewer, incl. 9,064 ft. 10- to 18-ft. vitr. or machine made concrete sewer with Standard concrete bed, 15 manholes, 9 junction chambers. Will readvertise.

Calif., San Diego—Bd. P. Wks., rejected bids complete sewage disposal plant for sewerage system at San Diego State College. Noted Sept. 25.

Ind., Danville — Sewage disposal plant, $50,000.

Ind., Washington—Sanitary sewerage system, disposal plant, $212,897. Jeup & Moore, 930 K. of P. Bldg., Indianapolis, engr. Noted Sept. 25.

N. J., Beachwood — Bd. Boro Comrs., Boro Hall, preliminary plans municipal sewage disposal plant, $25,000. Engineer not selected. **Maturity indefinite.**

N. J., Bound Brook — Boro Council, Boro Hall, preliminary plans piping brook along Vosseler Ave. $30,000. F. J. Gould, boro engr.

N. J., Livingston — Township Com., Town Hall, preliminary plans 24 mi. trunk line sewers. To exceed $25,000. Freeman & Winston, Livingston, twp. engrs.

Utah, Salt Lake City—For 20 blocks sewer in 27th St. from West Temple to 21st Sts. $150,000. H. Jessen, city engr.

Ont., Hamilton—See "Waterworks."

Ont., Lindsay—Sewage disposal plant. $60,000. O. Smith, Lindsay, engr.

Ont., Sarnia—City Council sewer from Exmouth to Frant Sts. $150,000. H. F. Hall, city engr.

BIDS ASKED

Ill., Chicago—Sanitary Dist. of Chicago, 910 South Michigan Ave., bids about Oct. 31 or Nov. 7, 2 mi. concrete sewer, 17 ft. diam., from 26th St. and Western Ave., to Canalport Ave. and Morgan St. $2,500,000. E. J. Kelly, 910 South Michigan Ave., engr.

Kan., Osawatomie—Oct. 27, by J. W. Allard, city clk., City Hall, 5,485 ft. 8 in. and 4,521 ft. 12 in. clay or concrete sewer pipe. Burns & McDonnell Eng. Co., 406 Interstate Bldg., Kansas City, Mo., engrs. Noted Oct. 8.

Ky., Louisville—Nov. 18, by Commissioners of Sewerage, 400 Marion E. Taylor Bldg., 4th and Jefferson Sts., M. H. Crawford, chn., Montana Avenue Sewer, Sect. A., Contr. 52. W. M. Caye, technical engr.; adv. E. N.-R. Oct. 23. Noted Apr. 17.

Mass., Boston — Oct. 30, by Dpt. P. Wks., sewerage works in Dorchester. $25,000. J. A. Rourke, comr.

N. J., Essex Fells—Oct. 27, by Boro Council, Boro Hall, sanitary sewers in Roseland Ave., Oak Lane and Wooton Rd. $25,000. C. H. Capen, Jr., boro engr. Noted Jan. 16.

N. J., Newton—Nov. 5, by Town Com., extending Sparta and Clinton Streets sewage treatment works, incl. grit and screen chambers, settling tanks, pumping station, trickling filter, final settling tanks, glass covered sludge beds, pipe lines, drains, force mains, appurtenances. T. F. Bowe, 110 William St., New York, consult. engr.; adv. E. N.-R. Oct. 23. Noted Oct. 9.

New York — Nov. 7, by Westchester Co. Sanitary Sewer Comn., Court House, White plains, constructing Sect. K, Sawmill Project Trunk Sewer, 1.5 mi. 30- to 66-in. c.i. and rein.-con. sewer in Greenburg from Park Ave., to point in Ardsley about 3,000 ft. below Woodlands Lake Dam, for Sawmill. E. S. Martin, secy.; adv. E. N.-R. Oct. 23.

Pa., Phila.—Nov. 5, by Dpt. P. Wks., Bureau Eng. & Surveys, City Hall Annex, A. Murdock, dir., Contr. 1, storm sewer, grading, also foundations and walls, removing existing masonry, fabrication and erection steel and connecting roofing of subway structure in Pennsylvania Ave. from 26th to 27th Sts. Former bids rejected. Noted Oct. 2, under "Streets and Roads."

R. I., Providence—Oct. 27, by Bd. Contr. & Supply, screen chambers, grit chambers, settling tanks and reconstructing present primary settling tanks for sewage disposal plant. To exceed $25,000. Total est. $1,000,000. S. F. Nolan, City Hall, engr.

Wash., Tacoma — City Comrs., bids about Oct. 27, 11,670 ft. 30 in. steel main in South Lawrence St. et al., replacing 22 in. main connecting with South Tacoma wells to J Street standpipe. $100,000. I. S. Davisson, supt. City Utilities.

CONTRACTS AWARDED

Ariz., Florence—City Council, sewerage system, to Phoenix-Tempe Stone Co., P. O. Box 1361, Phoenix, $36,920. Est. $61,074. Noted July 24.

Calif., Compton—See "Streets and Roads."

Calif., Long Beach—See "Streets and Roads."

Ky., Louisville—City at office Dpt. P. Wks., City Hall, A. A. Hill, dir., sewers in 22 streets, 20 contracts, to Cannell-Conrad Co., Equitable Life and Casualty Bldg., $80,805; 1 contract, to Henry Bickel Co., Inc., 6th and Lee Sts., $2,947; 1 contract, to H. H. Barker, 208 South Hite St., $3,248. Grand total $87,000.

La., New Orleans—Sewerage & Water Bd., at office A. G. Moffat, 526 Carondolet St., concrete lined canal in Florida Ave. between Louisa St. and Pumping Station 3, Contr. 210D, to Fuller Constr. Co., 1217 Palmetto St., $476,923. Noted Aug. 28.

Md., Baltimore—Bd. Awards, sanitary sewers in Sanitary Contr. 200, to N. Martell, 4400 Vesta Ave., $33,360. Noted Sept. 25.

Mass., Boston—Dpt. P. Wks., sewerage works in Franklin Hill Ave., Canterbury St., West Roxbury, to C. Russo, 499 Beech St., Roslindale. Est. $25,000. Noted Sept. 18.

N. Y., New York—H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., sewers in Bolton Ave., to Caserta Constr. Co., $2,281; Furman Ave., to Abita Constr. Co., 410 200th St., $2,156. Noted Oct. 2.

N. Y., Ogdensburg—Bd. P. Control, ¼ mi. 42 in. segmental tile sewer in Barre St., to A. F. McConville, Ogdensburg, $35,345. Noted Sept. 25.

N. Y., St. George—J. A. Lynch, pres. Richmond Boro, Boro Hall, sanitary sewers both sides Richmond Rd., to Trifoglio Constr. Co., 349 Carey Ave., West New Brighton. $8,992. Noted Oct. 2.

Okla., Tulsa—City, Cat Creek Relief Storm Sewer from Arkansas River to 4th St., to E. G. Fike & Co., Nebraska Bldg., $45,063. Est. $82,888.

S. D., Huron — Intercepting sewer, to C. Savonell, 2501 Jones St., Sioux City, Ia., $44,347; pumping equipment, to Fairbanks, Morse & Co., 417 South 4th St., Minneapolis. Noted Oct. 2.

Ont., Sudbury—W. J. Ross, city clk., sewage disposal plant, to San Dis Eng. Corp., 15 Park Row, New York. Est. $192,000. Noted Sept. 25.

WASTE DISPOSAL

PROPOSED WORK

Pa., Erie—City Council plans by F. A. Fuller, Erie, municipal garbage and rubbish incinerator. $150,000. J. P. Wadsworth, Erie, consult. engr. Noted July 30.

BRIDGES

PROPOSED WORK

Calif., Long Beach—For 1,335 ft. rein.-con. bridge, 70 ft. roadway, two 7 ft. sidewalks over Los Angeles River at Anheim St. $475,000. G. W. Firth, City Hall, engr.

Calif., Santa Rosa — Joint Hy. Dist. 16, Sonoma Co., two 145 ft. steel truss, and nine 60 ft. steel girder span I-beam bridge on rein.-con. piers with 24 ft. roadway over Russian River. $190,000. H. B. Hammill, 381 Rush St., San Francisco, engr.

La., Baton Rouge—State Hy. Comn., Baton Rouge, concrete or steel bridge wide enough for 6 automobiles to ride abreast over Industrial Canal. $250,000. W. H. Norckauer, hy. engr.

New Jersey—Bd. Freeholders Cape May Co., Cape May Court House, preliminary plans reconstructing double leaf bascule bridge across Great Channel, on hy. connecting Cape May Court House and Stone Harbor. $25,000 or R. Sharp, Court House, Cape May Court House, co. engr.

Tex., Fort Worth—Tarrant Co., c/o W.E. Yancey, aud., soon takes bids 2 steel, rein.-con. bridges over Trinity River on Randol Mill Rd. and Arlington-Grapevine Rd. $35,000. D. A. Davis, Fort Worth, co. engr.

Tex., Houston — City, c/o W. E. Monteith, mayor, rein.-con. bridge over Brays Bayou on Telephone Rd. $65,000. J. M. Nagle, city engr.

Tex., San Antonio—City, 110 ft. rein.-con., steel vehicular and pedestrian bridge, 36 ft. wide, precast stone railing, on Guilbeau St., $40,000. Cancelled contract for Martinez St. bridge. Noted July 17.

Wash., Seattle—American Can Co., Ellicott and Vine Sts., additional bridge, steel trussed span over Railroad Ave. from its factory to new dock under construction. $30,000. R. A. Gillespie, supt. constr.

Ont., London—City Council, submits proposition to rate payers in December to provide $75,000, for steel bridge over Thames River, at South Richmond St. W. P. Near, city engr.

Ont., Toronto — Dpt. P. Hys., Parliament Bldgs., concrete, steel bridge at top Woodbine Ave., probably concrete abutments, piers, steel spans, concrete floors. $400,000. A. A. Smith, Parliament Bldgs., engr.

BIDS ASKED

California—Nov. 12, by C. H. Purcell, ch. engr. State Hy. Comn., Pub. Wks. Bldg., Sacramento, 4 timber bridges, one twelve 19 ft. spans, one four 19 ft. spans, two 19 ft. spans each, all timber, frame bents, concrete footings. Kern Co.

Calif., Robbins — Oct. 31, by J. B. Heiken, secy. Joint Hy. Dist. 12, at Yuba City, 120 ft. rein.-con. trestle bridge over Main Drainage Canal of Reclamation Dist. 1500; 20 ft. concrete bridge over irrigation canal of Sutter Mutual Water Co., both in Sutter Co., near here. E. Von Geldern, Yuba City, engr.

Iowa — Oct. 28, at office C. R. Jones, aud. State Hy. Comn., Ames, raising 80 x 20 ft. pony truss bridge, and two 40 x 20 ft. I-beam approach spans, and 32 x 20 ft. I-beam bridge, 40 x 20 ft. pony truss bridge, 120 x 20 ft. high truss bridge, also 22 culverts, extensions, Rd. 71, F.A.P. 155 Cass Co.—constructing 140 x 20 ft. high truss bridge with six 40 x 20 ft. I-beam approaches, 8 culverts, extensions, Rd. 16, B-684 Dallas Co. — 9 culverts, extensions, Rd. 63, F.A.P. 209 and 1 culvert, extension, also raising 60 x 20 ft. pony truss bridge, Rd. 3, F.A.B. 153 Davis Co.—29 culverts, extensions, raising 50 x 20 ft. pony truss bridge, Rd. 7, F.A.B. 51 Guthrie Co.—16 x 24 ft. I-beam span bridge on creosoted piling found., 28 culverts, extensions, Rd. 155, B-689 Polk Co.—18 culverts, extensions, raising 80 x 20 ft. pony truss bridge, Rd. 15, F.A.B. 72 Story Co. R. F. White, hy. engr.

Ia., Independence—See "Streets and Roads."

Kansas—See "Streets and Roads."

Kan., Newton—Oct. 30, by C. A. Young, clk., Harvey Co., Court House, Bridge 7, five 30 ft. deck girder spans with 20 ft. roadway, 2 mi. from Hesston—Bridge 8, six 40 ft. deck girder spans, 20 ft. roadway, 1 mi. from Halstead—Bridge 9, three 8 ft. concrete box spans, 28 ft. roadway, 4 mi. from Putnam—Bridge 12, three 10 ft. concrete box spans, 28 ft. roadway, 3 mi. from McLain.

Mass., Boston—Oct. 28, by Dpt. P. Wks., hydraulic cylinders at Charlestown Bridge Draw.

Mass., Harwich—Oct. 28, by Dpt. P. Wks., Boston, A. W. Dean, engr., 650 ft. timber pile bridge with bitulithic concrete approaches, for Commonwealth of Massachusetts, Boston.

Missouri—Oct. 31, by State Hy. Bd., Jefferson City, bridges in Andrew, Barry, Howard, Jasper, Lawrence, Linn, McDonald, Monroe, Morgan, Newton, Oregon, Pemiscot, Phelps, Platte, Ralls, St. Louis and Taney Counties. T. H. Cutler, ch. engr.

N. J., Mantoloking—Bd. Freeholders Ocean Co., Court House, Toms River, bids about Nov. 1, timber and pile bridge with mechanical jacknife draw from here to West Mantoloking, $250,000. H. C. Shinn, Municipal Bldg., Lakewood, co. engr. Noted Oct. 16.

B. C., Hazelton—Nov. 3, by P. Philip, engr. Dpt. P. Wks., Victoria, erecting 460 span suspension bridge over Hagnelgate Canyon, 3 mi. from New Hazelton on Canadian Natl. Ry., $30,000. Provincial Govt., Victoria, supplies all material, incl. 375 tons structural c.i. and cast steel, 31,800 ft. wire rope. Piers are in place.

CONTRACTS AWARDED

Calif., Long Beach—C. H. Purcell, engr. State Hy. Comn., Sacramento, fifteen 19 ft. timber spans with concrete deck, one 41 ft. 4 in. steel beam removable span bridge over Alamitos Bay, near Los Angeles Co., near here, to W. F. Teschke, Hollywood, $39,544. Noted Sept. 18.

Calif., Sacramento — Sacramento Co., steel drawn span and untreated timber trestle bridge over Snodgrass Slough, to C. J. Nystedt, Capital Natl. Bank Bldg., Sacramento, $44,966.

Calif., Salinas—Monterey Co., bridge over Elkhorn Slough on Salinas-Watsonville Rd. near Moss Landing, to B. C. Gerwick, Inc., 112 Market St., San Francisco, $31,219.

Florida—State Road Dpt., Tallahassee, rein.-con., steel bridge over Dunnes Creek, Project 952, Putnam Co., to Atlantic Bridge Co., Greensboro, N. C., $82,228; structural steel, treated timber bridge over Tom's Bayou, Project 802-B, Okaloosa Co., to J. R. Chambliss, Tampa, $56,552.

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Bridges (Continued)

Ind., Crown Point—Bd. Comrs. Lake Co., to O. E. Nichols, Hebron, Bridge 302, over Deep River at Liverpool, $22,260 est. $25,000; Bridge 1109 over Vanatta Ditch, $1,885 est. $2,500—to Subway Eng. Co., 115 South Dearborn St., Chicago, Ill., Bridge 202 over Little Calumet River, $10,990 est. $14,000; Bridge 117 over Grand Calumet River, $8,894 est. $10,500; Bridge 135 over Little Calumet River, $3,799 est. $5,000—to Barnes Bros. Constr. Co., Gary, Bridge 353 over Burns Ditch, $12,380 est. $17,000—to East Chicago Constr. Co., East Chicago, Bridge 1160 over Brown Ditch, $5,223 est. $7,000; Bridge 407 over Turtle Ditch, $4,665 est. $6,300—Grand total $70,096. Also to F. E. Muzzall & Sons, Crown Point, Bridge 219 over Little Calumet River, est. $14,500; Bridge 727 over Beaver Dam Ditch est $3,000; Bridge 526 over Deer Creek est. $3,000. Noted Oct. 2.

Kentucky—State Hy. Dpt., Frankfort, 155 ft. rein.-con. arch bridge with one 29 ft. and one 43 ft. rein.-con. deck girder approach spans over Otter Creek at Grahampton, Federal Aid Project 203-AB, Meade Co., to J. U. Schickli & Bros., 21st St. and Greenwood Ave., Louisville, $21,372. Noted May 29.

Minnesota—State Hy. Dpt., St. Paul, Bridge 4930, at St. Peter, to Minneapolis Bridge Co., 701 Metropolitan Ave., Minneapolis, $99,000; Bridge 5032, Sect. 1, S.P. 20-27, to A. Guthrie & Co., Builders Exch., St. Paul, $31,175. Noted Oct. 2.

Minn., Minneapolis — Hennepin Co., Court House, Bridge 10 rein.-con., on County Rd. 7, project 922, to Independent Bridge Co., 1101 Metropolitan Life Bldg., $23,517. Noted Sept. 25.

Missouri—State Hy. Bd., Jefferson City, to Gaines Bros. Co., Jefferson City, bridges in Buchanan Co., $19,849; over south fork Linn Creek, $9,814, over East Fork, Linn Creek, $14,875, both Camden Co.—to M. Wunderlich, St. Paul, Minn., in Buchanan Co., $1,545; Wayne Co. $1,472—to C. I. Williams, Monett, over Clear Creek, $1,347; over Branch Creek, $693, both Lawrence Co.—to Service Constr. Co., Poplar Bluffs, over Rankin Branch, $1,681, over Branch, $1,310, both Iron Co. — to Knutson Bros., 3520 Main St., Kansas City, over High Hill Ditch, $2,818; over Holl Branch, $5,043, both Atchison Co. — to Kelly & Underwood, Granby, over Dry Wash., $3,071; Birch Tree Rd., $1,973; over Dry Wash, Sta. 1586-75, $2,042; over Dry Wash, Sta. 1528-96, $4,297, all foregoing in Shannan Co.—to O. O. Fuller, Nevada, over Field's Creek, $5,300; over South Grand River Overflow, Sta. 58-20 $10,838; Sta. 42-100 $6,730; Sta. 22-00 $4,527, all foregoing in Henry Co.—to R. B. Potashnick, Cape Girardeau, Ripley Co., $1,888; Scott Co., $5,978—to C. H. Atkinson Paving Co., Watertown, S. D., in Schuyler Co., $5,739—to Davis Constr. Co., Inc., Boonville, Pettis Co., $3,137—to M. E. Gilliox, Monet, Bates Co., $2,387—to J. A. Kerr, Ozark, Laclede Co., $3,067—to Kiefner & Geile Constr. Co., Perryville, Stoddard Co., $4,775—to P. McGlone, Harrisonville, Jackson Co., $10,462 — to Nevada Constr. Co., Nevada, Vernon Co., $17,019—to H. D. Thomas Fulton, in Montgomery Co., $841. Grand total $154,518. Bids rejected bridges in Lewis and Ozark Counties. Noted Sept. 18.

Missouri—State Hy. Bd., Jefferson City, to Maxwell Constr. Co., Columbus, Kan., bridges over Centre Creek, $7,396; over same creek Sta. 768-56, $16,387; over branch, 1,200, on Route 57N, $5,939, all foregoing Jasper Co.—J. Kesl & Son, Edwardsville, over Little Black River Sta. 54-22, $14,368, and Sta. 62-55, $13,021; both Butler Co. to Kelly & Underwood, Granby, over Sweetwater Branch, $1,510; over Dry Branch, $14,801, both Newton Co., to M. E. Gilloz, Monett, over Brush Creek, $11,087; over ditch, $710; over Miser Hollow, $1,943; over Dry Branch, $3,976, all foregoing in McDonald Co.—to M. Wunderlich, St. Paul, Minn., over Clark Creek, $2,836; over branch, $1,985; over creek, $1,974, all foregoing Wright Co.—to Knutson Bros., Kansas City, over Evans Creek, Gentry Co., $4,171—to Wisconsin Bridge & Iron Co., Milwaukee, Wis., over Mangua River, $170,870; over Meramec River, $158,122, both St. Louis Co.—to W. K. Ferman & Co., LaPlata, over North River, $3,107; over North River, Sta. 1211-23, $4,135; and on Swan Corner Rd., $8,648—to R. E. Martin, Nashville, Tenn., over Buffalo Creek, McDonald Co., $10,109—to Linus Penzel, Jackson, Miss., over Wolf Hole, Mississippi Co., $4,577—to Neyer Constr. Co., Billings, over Dry Branch Creek, Dade Co., $2,412—to Samples & Elsea, Kirksville, over east fork Charlton River, Macon Co., $5,615—to C. E. Rich & Co., Troy, over West Branch, Washington Co., $2,628—to E. C. Johnson Constr. Co., Carrollton, on Route 22 Boone Co., $4,557. Grand total $478,084. Noted Oct. 2.

N. J., Linwood—Bd. Freeholders Atlantic Co., Guarantee Bldg., Atlantic City, steel, concrete bridge, Bargaintown Mill Pond, to F. W. Schwiers Jr. Co., 90 West St., New York. Est. $25,000. Noted Oct. 2.

New York—A. W. Brandt, comr. Hys., Albany, bridges in Herkimer Co., to G. Jenkins, Ilion, $8,679 est. $12,674; Orange Co., to Riteway Constr. Corp., 299 Bway., New York, $80,047 est. $108,859. Noted Sept. 11 and 25 under "Streets and Roads."

O., Cincinnati—Comrs. Hamilton Co., Court House, 180 ft., concrete bridge North Bend Rd., to Hailey & Taylor, 3342 Burnet St., $42,997. Est., $53,798. Noted Sept. 4.

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Que., Montreal—Canadian Natl. Rys., superstructure section main viaduct of Montreal Terminal development between St. Antoine and Ottawa Sts., to Dominion Bridge Co., 1111 Beaver Hall. (Foundation work and masonry awarded to Atlas Constr. Co., 37 Belmont St. and Foundation Co. of Canada, 1538 Sherbrook St. W., Oct. 7). Viaduct forms southern approach to new central passenger terminal, approximately 2,000 ft. long, 112 ft. wide, 50,000 cu.yd. concrete, 180,000 lin. ft. concrete piles, 8,000,000 lb. rein. rods, 3,800,000 lb. structural steel, 24,000 sq.yd. waterproofing.

STREETS AND ROADS

BIDS ASKED

California—Nov. 5, at office C. H. Purcell, state hy. engr. Pub. Wks. Bldg., Sacramento, grading, drainage structures concrete paving 0.2 mi. road near Wasco, Kern Co.

Calif., Englewood—Nov. 3, by City Council, grading, guttering, 2 in. durite on 4 in. asphaltic concrete paving 122,600 sq.ft. Van Ness Ave. W. Peffer, city engr.

Calif., Glendale—Nov. 6, by City Council, 8 in. concrete and 3 and 5 in. asphaltic concrete paving waterworks, street lighting system on San Fernando Rd. $200,000 or more. J. C. Albers, city engr.

Calif., San Francisco — Oct. 29, by S. J. Hester, secy., Bd. P. Wks., improving Sect. C-Alemany Blvd., incl. 8- to 21-in. vitr. clay pipe sewers, 54,000 gal. fuel oil for oiling sub-grade, 400 lb. barley for slope planting, $25,000.

Ga., Blackshear—Nov. 4, by City, grading, storm sewers, concrete, vitr. brick or asphalt paving 11,000 sq.yd. H. S. Jandon Eng. Co., Elberton, engrs.

Idaho—Oct. 28, by J. D. Wood, comr. P. Wks., Boise, grading, crushed graveling 8.009 mi. Yellowstone Park Hy. between Chester and Ashton, F.A.P. 115-A, Fremont Co.; grading, crushed rock surfacing 8.676 mi. Payette Hy., Donnelly South, F.A.P. 130-F, Valley Co.

Illinois—Oct. 27, by State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, concrete paving 0.31 mi. Route 3, Sect. 75-W, Randolph Co., 18 ft. State furnishes cement. F. T. Sheets, ch. hy. engr.

Ill., Chicago—Oct. 28, by City at office Bd. Local Imprvts., City Hall, grading, curbing, guttering, sewers, 8 in. concrete and asphalt on 6 in. concrete paving South Bishop, East 87th, West 61st, Heyden, Hulburt, South Honore, South Lincoln, West 84th, 85th, 97th, 98th, South LaSalle Sts., Bryn Mawr, South Damen, North Harlem, South Kidvale, South Laramie, Hobart, North Neva, Somerset, Northcott, South Winchester, South Hoyne, South Hamilton, Mulligan, Catalpa, Balmoral, Princeton, Harvard, Yale, Perry, Lafayette, Wentworth, Oketo, Oriole, Olcott and Isham Aves. M. J. Faherty, pres.

Ind., Bedford—Nov. 3, by Bd. Comrs. Lawrence Co., constructing Rd. 5 known as Gilgal Rd. $11,446—Rd. 6, Meadows School House Rd. $26,860—Rd. 7, Rolla Holmes Rd. $20,555—Rd. 8, Williams and Indian Springs Rd. $2,695—Rd. 9, Milton Chess Rd. $9,411—J. J. Taylor, co. aud.

Iowa—Oct. 28, at office C. R. Jones, aud. State Hy. Comn., Ames, grading, drainage structures 6.52 mi. Rd. 155, P. 689 Polk Co.—gravel surfacing 9.417 mi. Rd. 9, P. 368 Dickinson Co.—6.902 mi. Rd. 9, P. 197 Osceola Co.—2.649 mi. Rd. 48, P. 264 Page Co. R. F. White, hy. comr.

Ia., Independence—Oct. 30, at office Auditor Buchanan Co., gravel surfacing 9.75 mi. local and trunk roads; also 3 bridge fills in Madison, Hazelton and Cono Twps.

Kansas—Nov. 7, by State Hy. Dpt., Topeka, at Court House, Winfield, grading, culverts 3.672 mi. Project 77-3 and 4, Federal Aid Project 230-A, incl. three 8 ft. and three 9 ft. multiple span bridges; 3.485 mi. Project 77-4, Federal Aid Project 230-B, incl. three 9 ft. multiple span bridge, both Cowley Co. W. V. Buck, hy. engr.

Kentucky — Nov. 26, by State Hy. Dpt., Frankfort, grading, drainage structures 15.6 mi. Owenton-Frankfort Rd., F.A.P. 221-AG Owen Co. — 2.7 mi. Tiptop-Grahampton Rd., F.A.P. 203-AG Meade Co.—5.4 mi. Hartford-Fordsville Rd., S.A.P. 45-EG Ohio Co.—3.4 mi. Horse Cave-Bear Willow Rd., F.A.P. 192-AG Hart Co. B. Johnson, chm.

Kentucky—Nov. 26, by State Hy. Com., Frankfort, grading, drainage structures 3.3 mi. Tompkinsville-Meshak Rd., State Aid Project 40‡BG, Monroe Co.; 4.3 mi. Leitchfield-Hardinsburg Rd., State Aid Project 138-AG, Grayson Co. B. Johnson, chm.

Maryland—Oct. 31, by State Roads Comn., Baltimore, concrete paving 0.38 mi. Contr. Wi-68-14, Wicomico Co. G. C. Uhl, Baltimore, chn.; adv. E. N.-R. Oct. 23.

Massachusetts — Oct. 28, by Dpt. P. Wks., A. W. Dean, engr., Boston, rein.-con. paving 9,687 ft. and constructing steel stringer bridge, 9,687 ft. hy. Attleboro—rein.-con. paving 883 ft. Clinton—bituminous macadam paving 2,325 ft. approaches to bridge, Charlemont—910 ft. approaches to bridge in Buckland.

Mass., Boston—Oct 29, by Dpt. P. Wks., sheet asphalt or bitulithic paving Audubon Rd., Ward 21. $25,000. J. A. Rourke, comr.

Michigan—Oct. 28, by R. W. Roberts, resident engr., Saginaw, grading, draining, concrete paving 7.986 mi. FO25-25 Contr. 1, Genesee Co., 20 ft., for State Hy. Comn., Lansing.

Michigan—Oct. 29, by C. L. Cowgill, resident engr., Plymouth, grading, draining, concrete paving 14.287 mi. FO63-30C-1 and MO63-30C-2, Oakland Co., 20 and 40 ft., for State Hy. Comn., Lansing.

Michigan—Oct. 29, by J. T. Sharpensteen, div. engr., Escanaba, grading, culvert, 2 course gravel surfacing 0.085 mi. Mo-21-20, Contr. 2, Delta Co., 18 ft., for State Hy. Comn., Lansing. E. H. Haahr, Newberry, resident engr.

Michigan — Oct. 30, at office Village Clerk, Vassar, grading, shaping, concrete paving 4.695 mi. FO79-34C-1 and MO79-34C-2, Tuscola Co., 20 ft., for State Hy. Comn., Lansing. E. R. Benkert, Port Huron, resident engr.

Minnesota—Nov. 12, by State Hy. Dpt., St. Paul, grading 16.5 mi. S.P. 2034, F.A.P. 386A—18 mi. S.P. 12-27, Sect. 1, F.A.P. 385A, S.P. 12-34, Sect. 1, F.A.P. 103, and S.P. 12-34, Sect. 2, Div. A, F.A.P. 350E—18.7 mi. S.P. 12-34 Sect. 2, Div. B, F.A.P. 350E, S.P. 12034, Sect. 3, F.A.P. 350D and S.P. 12-26, Sect. 2, F.A.P. 350C—21.3 mi. S.P. 18-23, Sect. 2, F.A.P. 3B—11.1 mi. S.P. 46-21, Sect. 1, F.A.P. 384C. State Eng. Dpt., 1246 University Ave., state engrs.

Miss., Walthall—Nov. 3, by Bd. Comrs. Mantee and Dancy Separate Road Dist., Webster Co. (**P. means Project**), preparing sub-grade, hauling, spreading gravel 3.1 mi. P. 1, State Hy. 15—6.9 mi. P. 2, Clay Co. Line-Mantee Rd.—4.6 mi. P. 4, Mantee School House-Dancy Rd.—3 mi. P. 16 from intersection Cumberland-Maben Rd. to Clay Co. line—2 mi. P. 17, Walthall Co.-Home Rd.—7 mi. P. 18, Bellefontaine-Grenada Hy.—12 mi. Europa-Alva Rd. from Center to Alva. Separate Rd. Dist. A.

Missouri—Oct. 31, by State Hy. Bd., Jefferson City, roads in Caldwell, Greene, Howard and Pemiscot Counties—grading roads in Andrew, Caldwell, Clinton, Greene, Howard, Jasper, Monroe, Newton, Pemiscot and Platte Counties—chat surfacing roads in Lawrence, Ray and Vernon Counties — graveling roads in Barry, Carter, Dunklin, Howell, Linn, McDonald, Morgan, Oregon, Phelps, Platte, Ralls, Shannon, Taney and Webster Counties. T. H. Cutler, ch.

Mo., Clayton — Oct. 29, by St. Louis Co., Court House, concrete paving 8,371 ft. Tesson Terry Rd.—0.25 mi. North and South Rd.—1,900 ft. Lockwood Ave. — constructing concrete viaduct over Missouri Pacific R.R. R. Jablonsky, Court House, engr.

Nebraska—Oct. 30, by State Hy. Dpt., Lincoln, grading, bridging, culverts, sand and gravel surfacing 22.3 mi. roads. R. L. Cochran, State House, Lincoln, state engr.

New York—Oct. 30, by A. Goldman, comr. Plant & Structures, Municipal Bldg., New York, paving under Greenpoint Avenue Bridge, Queens and Brooklyn Boros.

N. Y., New York—Oct. 29, by H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., grading, curbing, sidewalks, White Plains Rd., Hering, Goulden, Newman, Halpern, Lacombe, Seymour and Zulette Aves., Magenta, West 232nd, Odell Sts.

Pa., Phila.—Oct. 28, by Dpt. P. Wks., Bureau Hys., A. Murdock, dir., City Hall Annex, asphalt paving (assessment work)—City Road Improvement — ashalt repaving — ready mixed concrete.

Pa., Phila.—Nov. 5, by Bureau Hys., Dpt. P. Wks., City Hall Annex, A. Murdock, dir., Schedule A, asphalt paving (assessment work) 10 streets — Schedule B, asphalt repaving School House Lane and Market Square Rd.—Schedule C, redressed granite block repaving 12th St., incl. shoulders—Schedule D, country road improving Tabor Rd.

Pa., Phila.—See "Sewers."

Pa., Pittsburgh—Oct. 28, by R. G. Woodside, controller Allegheny Co., removing 9 buildings, grading, curbing, guttering, sewers, culverts, 990 sq. yd. tar and membrane waterproofing, 44,500 sq. yd. concrete surfacing, 700 sq. yd. 2 in. asphaltic concrete surfacing, 200 sq. yd. penetrated slag surfacing, 32,000 lb. reinforcing steel bars. Flaugherty Rd. $319,000. E. A. Griffith, 519 Smithfield St., engr.

Tex., Houston — City, c/o W. L. Monteith, mayor, postponed taking bids Oct. 22, 1¼ in. on 6 in. concrete paving 11,000 sq.yd. South MacGregor Dr. from Southland Terrace to Scott St. $47,640. J. M. Nagle, Houston, engr. Noted Oct. 16.

CONTRACTS AWARDED

Alabama — State Bd. Administration, Montgomery, 7 in. concrete paving 9.93 mi. Birmingham-Tuscaloosa Hy., Jefferson Co., to Morgan-Hill Paving Co., Woodward Bldg., Birmingham, $120,968. Noted Oct. 2.

Ark., Pecan Point—Grading, drainage structures, graveling, culverts, to Gassell Constr. Co., Wilson, $50,000.

California—State Hy. Comn., Sacramento, bituminous treated crusher run base surfacing 7.3 mi. San Mateo-Redwood City Rd., San Mateo Co., to Frederickson & Watson and Frederickson Bros., 354 Hobart St., Oakland, $120,819. Noted Sept. 18.

California — State Hy. Comn., Sacramento, concrete surfacing 0.3 mi. San Bernardino Co., to M. Green, San Bernardino, $32,389; grading, concrete paving 0.6 mi. Santa Barbara Co., to Cornwall Constr. Co., Santa Barbara, $23,362. Noted Sept. 25.

Calif., Anaheim—Grading, curbing, sidewalks, asphaltic concrete paving, using corrugated iron pipe, West Central St., to Hollywood Paving Co., 8525 West 3rd St., Los Angeles, $56,165.

Calif., Bell—City Council, curbing, walks, sewers, grading 125,000 sq.ft. Loma Vista Ave., to Fisher Equipment Co., 4427 Firestone Blvd., Southgate, $25,950. Noted July 31.

Calif., Compton—City Council grading, watermains, vitr. sewers, concrete paving Golden and Poppy Aves., et al, to M. A. and P. R. Hughes,

Streets and Roads (Continued)

1020 Loma Vista Ave., Long Beach, $25,308. Noted Sept. 25.

Calif., Long Beach—City Council, curbing, sidewalks, watermains, sanitary sewers in 67th Way, to D. P. Durham, 900 Raymond Ave., $24,717; curbing, sidewalks, asphaltic concrete paving 102,550 sq.ft. 23rd and Chestnut Sts., to Sully-Miller Co., 1500 West 7th St., $19,640. Noted Sept. 25.

Calif., San Francisco—S. J. Hester, secy. Bd. P. Wks., City Hall, improving Sect. C-Sunset Blvd., to California Constr. Co., Stanard Oil Bldg., $103,844. Noted Sept. 25.

Calif., Stockton—San Joaquin Co., to Pereira & Reed, Roosevelt Ave., Tracy, improving Russell Rd., (a) 8,000 cu.yd. grading at $0.20, 4,700 tons base course $1.53, 3,400 tons top course $1.53, 2,290 ft. b.m. culvert over pipe, total $14,167, (b) 20,000 cu.yd. grading $0.19, 10,800 tons base course $1.15, 7,900 tons top course $0.15, installing 3 pipes $5, total $25,320.

Calif., Ventura—Ventura Co., grading, concrete paving, corrugated iron pipe, Ventura Ave., to P. Cristich, California Reserve Bldg., Los Angeles, $30,250. Noted Sept. 25.

Florida—State Road Dpt., Tallahassee, clearing, grubbing, grading, 2.48 mi. P. 695, Lake Co., to Manly Constr. Co., Ocala, $4,664—clearing, grubbing, grading, concrete retaining wall 4.48 mi. P. 53-D, Lake Co., to C. C. Moore Constr. Co., Apalachicola, $81,029—broken stone base course surfacing P. 535, Lafayette Co., to Wm. P. McDonald Constr. Co., Lakeland, $169,820—54,000 gal. oil asphalt for P. 714, Union Co., to Pan American Petroleum Corp., Rhodes-Haverty Bldg., Atlanta, Ga., $2,900—2,702 tons crushed rock, f.o.b. Guilford for P. 714, Union Co., to Florida Crushed Stone Co., Ucola, $8,241—3,148 cu.yd. ready mixed concrete, to Capital Concrete Co., 623 Palmetto St., South Jacksonville, $29,686—800 tons cold binder course, to Wm. J. Bryson Contg. Co., West 14th St., Jacksonville, $8,936—2,949 tons macadam asphalt, to Macadam Asphalt Co., Lakeland, $31,171, all foregoing for P. 884, Duval Co. Grand total $336,447.

Ga., Hogansville—At office City Clerk, curbing, sewers, 6 in. vibrolithic concrete paving 8,500 sq.yd. Main, College and Oak Sts., to Way Constr. Co., Valdosta, Ga., $20,408.

Idaho—J. D. Wood, comr. P. Wks., Boise, grading, crushed rock surfacing 11.003 mi. Bear Lake Hy., Bear Lake Co., to Sutherland & Burns, Missoula, Mont., $83,408. Noted Sept. 25.

Ill., Chicago—Bd. Local Impvts., City Hall, grading, curbing, guttering, sewers, 8 in. concrete pavnig Barry Ave. from North Central to North Austin Aves. and from North Lakewood to North Central Aves., to J. A. Ross & Co., 4561 Armitage Ave., $52,241 and $38,545 respectively — Wellington Ave., to Marquette Constr. Co., 5726 North Winchester St.,$49,262—West 53rd St., South Knox, South Kilpatrick and South Keating Aves., to Chicago Constr. Co., 228 North La Salle St., $70,341—83rd St., Wentworth and Stweart Aves., to American Asphalt Paving Co., 120 South La Salle St., $46,306—grading, curbing, guttering, sewers, asphalt on 6 in. concrete paving East 84th St., to Farr Bros. Co., 356 West 111th St., $24,843—East 86th St., to R. F. Conway Co., 33 North La Salle St., $11,145—Schubert Ave., to White Paving Co., 1735 Fullerton Ave., $66,687—Spokane, Nokomis, Navajo and Hiawatha Aves., to Barber Paving Co., 7 South Dearborn St., $84,893. Grand total $444,263. Noted Sept. 25.

Ill., Chicago—Bd. Local Impvts., City Hall, 6 ft. concrete sidewalks on East 81st, 82nd, West 105th, 106th, 107th, South Mangum, South Carpenter, South Halsted and Aberdeen Aves., to Aldrich Constr. Co., 140 South Dearborn St.—West 81st, 82nd, 83rd and 84th Places, West 81st, 82nd, 83rd, 84th and 85th Sts., South Lawndale, South Hamlin, South Homan and South St. Louis Aves., to Banner Constr. Co., 384 North Harding Ave.—West 83rd Pl., West 82nd and 84th Sts., South Kedzie, South Spaulding, South Homan and South Talman Aves., to Albert Graff & Co., 30 North La Salle St.—West 79th and 80th Places, 80th and 81st Sts., South Lawndale and South Hamlin Aves., to Siewart-Callsen Co., 3865 Milwaukee Ave.—West 111th, 94th, 105th and South Leavitt Sts., South Irving, South Oakley and North Western Aves., to Superior Concrete Constr. Co., 135 West Washington St.—Cortland St., North Albany, Greenview and North Mulligan Aves., to P. Lutsch, 1902 Farragut Ave.—South Racine Ave., Hampden, Filmore and Iron Sts., to J. J. Croake, 2927 Fullerton Ave. Noted Sept. 4

Ill., Collinsville—City Clerk, grading, drainage structures, curbing, 7 in. concrete paving 12,562 sq.yd. Brown Ave., Pavement Impvt. Dist. 30-A, to Joseph Keel & Son, Edwardsville, $50,000.

Ill., Edwardsville—F. J. Schlemer, hy. comr., grading, concrete surfacing 1.419 ft. Glen Carbon Rd., 16 ft. with 4 ft. earth shoulder, to C. F. Mindrup & Son, Edwardsville, $6,667. Noted Sept. 18.

Ill., Kenilworth—Widening, paving Railroad Ave., its link in McCormick hy. program from Evanston to Glencoe, to M. Foley Co., Evanston, $75,698.

Ind., Lebanon—Boone Co., grading, drainage structures, concrete surfacing S. V. Titus Rd., to W. C. Halstead, 1041 West 25th St., Indianapolis, $29,116 est. $34,928; gravel surfacing William F. Sweet Rd., to E. S. Stansell, Lebanon, $9,420 est. $13,999. Noted Oct. 2.

Ind., Terre Haute—Vigo Co. gravel surfacing 13,482 ft. E. C. Coffey Rd., to E. Wood, Brazil, $28,595 est. $30,421; J. L. Figg Rd., to H. Quinn, Terre Haute, $7,913.

Kansas—State Hy. Comn., Topeka, at Court House, Oskaloosa, to Cook & Cone, sand gravel or chats surfacing 8.153 mi. F.A.P. 322, Sect. E $10,931; 5.284 mi. Sect. D same road $7,175; regraveling 10 mi. Brown Co., $6,440 — to A. G. Sherwood, Independence, 2.6 mi. Johnson Co., $2,350; sand gravel or chats surfacing 7.007 mi. Douglas Co., $9,921; grading, culverts 0.226 mi. Marshall Co., $2,706—to Geiger & Rutherford, 626 Cherokee St., Leavenworth, 1.021 mi. Lyons Co., $5,912; concrete paving 0.707 mi. Ford Co., $19,293—to Western Bridge & Constr. Co., 3867 Leavenworth St., Omaha, Neb., regraveling 8 mi. P. 7104, $4,240; 6.8 mi. P. 7103, $4,080, both Nemaha Co.—to E. M. Eby, Wellington, 10 mi. Project 7101, Osage Co., $5,380; 4.5 mi. P. 7100, $2,151—to San-Ore Constr. Co., McPherson, 18.5 mi. P. 7120, Atchison Co., $7,138 — to M. W. Watson, Topeka, 0.473 mi. P. 7109, $302; 1.362 mi. P. 7110, $830; 6 mi. P. 7108, $3,576, all in Atchison Co.—to Rowland & Triska, Hanover, 9.5 mi. Doniphan Co., $3,059—to B. Metzger, Ozawkie, 2.5 mi. P. 7096, $1,475; 6 mi. P. 7097, $3,540; 6 mi. P. 7099, $2,928, all foregoing in Jefferson Co.—to McMillen & Furman, Emporia, 1 mi. Lyons Co., $574—to Grudenmann Bros., Netawaka, bridge in Marshall Co., $3,795. Grand total $107,796. Noted Oct. 9.

Kansas—W. V. Buck, engr. State Hy. Comn., Topeka, Court House, Lyndon, grading, culverts 6.188 mi. U. S. Rd. 50N, Federal Aid Project 419-A, Osage Co., 30 ft., to Geiger & Rutherford, Leavenworth, $51,533.

Kansas—State Hy. Comn., Topeka, at Court House, Newton, to W. D. Shay, McPherson, re-gravel surfacing 4 mi., K. P. 7088, $640; 11.1 mi. 7089 $3,164; 12.1 mi. 7090, $2,517, all Ford Co.—to D. G. Hansen, Logan, 16 mi. Hamilton Co. $5,612, 7 mi. 7092, $3,080; 8 mi. 7093, $3,952; 11.5 mi, 7094 $5,060, all Scott Co.—to San-Ore Constr. Co., 5 mi. 5060, $1,650; oil treated surfacing 3.25 mi. 7119, $7,568, both Finney Co. Grand total $33,243.

Ky., Louisville—City, at office Dpt. P. Wks., City Hall, A. A. Will, dir., constructing and reconstructing streets, 1 contract, to J. U. Schickli & Bros., 1300 West Oak St., $18,142—4 contracts, to Henry Bickel Co., Inc., 6th and Lee Sts., $10,850—3 contracts, to Andrews-Collings Asphalt Co., Louisville, $13,875—2 contracts, to G. M. Eady Co., 340 Byrne St., $8,496—reconstructing alleys, 2 contracts, to E. Brewer, 1233 West Jefferson St., $1,119—1 contract, to C. W. McFarland, 1220 River Rd., $1,372—1 contract, to H. C. Showalter, Louisville, $1,346. Grand total $55,200.

Maryland—State Roads Comn., Baltimore, concrete paving 0.8 mi. Contr. Wo-77-12, Worcester Co., to Hannemann-Burroughs Co., Salisbury, $14,338. Noted Sept. 25.

Massachusetts—Dpt. P. Wks., Boston, bituminous macadam paving 15,959 ft. hy. Windsor, to Kelleher Corp., Turners Falls, $134,885; rein.-con. paving 2,800 ft. Arlington, to State Constr. Co., 509 Main St., Saugus, $22,931. Noted Oct. 2.

Massachusetts — Commonwealth of Massachusetts, Boston, and Worcester Co., Worcester, bituminous macadam paving 13,000 ft. and not less than 8,000 ft. hy. Boylston and West Boylston, to Perini & Ampollini, 24 Waverly St., Framingham, $42,098.

Minnesota—State Hy. Dpt., St. Paul, grading 6.6 mi. S.P. 3-53, Sect. 2, and 21 mi. S.P. 7-31, Sect. 1, to Lobnitz Bros., Willmar, $54,275 and $110,380 respectively—17.1 mi. S.P. 5-41, F.A.P. 26A and S.P. 5-38, Sect. 4, F.A.P. 422A, to Erickson & Johnson and R. B. Fraser, 3631 26th Ave. S., Minneapolis, $117,729—5.3 mi. S.P. 9-28, F.A.P. 147B, to A. Guthrie & Co., Builders Exch. Bldg., St. Paul, $110,380—S.P. 20-37, Sect. 2, F.A.P. 137, to Thoreen, Sandreen & Sutton, Stillwater, $65,545. Grand total $458,309. Noted Oct. 2.

Minn., St. Paul—Grading, paving 3rd St., to Feyen Constr. Co., 277 Burgess St., St. Paul, $27,400.

Mississippi—State Hy. Comn., Jackson, gravel surfacing 13.183 mi. Sects. A, B and C, Oxford-Sardis Rd., Lafayette Co., to Clark & McCaa, Jackson, $20,704; constructing section Reddock Ferry-Mt. Olive Rd., Sect. 4, Covington Co., to J. K. and J. E. Byrd, Mt. Olive, $1,878. Noted Sept. 18.

Missouri—State Hy. Bd., Jefferson City, to Brosnahan Bros., 318 City Bank Bldg., Kansas City, grading, concrete paving 1.849 mi. Jackson Co., $103,202—to Pioneer Constr. Co., 270 Glover Bldg., Kansas City, chats surfacing 3.267 mi. Cass Co., $11,063—to O. O. Fuller, Nevada, 6.686 mi., Henry Co., $35,600 — to Gaines Bros. Co., Jefferson City, grading, concrete surfacing 2.596 mi. Buchanan Co., $66,187; 2.41 mi. Buchanan Co., $66,986; grading 2.691 mi. Miller Co., $53,888; 18.344 mi. Camden Co., $240,818—to Chaney & Amyx, Branson, 4.434 mi. Oregon Co., $16,839; graveling 9.907 mi. Texas Co., $19,283—to M. Wunderlich, St. Paul, Minn., grading 3.27 mi. Wayne Co., $22,569; crushed stone surfacing 4.585 mi. Buchanan Co., $13,033; graveling 3.993 mi. Maries Co. $25,488—to W. D. Knoll, Gainesville, 8.336 mi. Douglas Co., $8,252—to C. I. Williams, Monett, 6.956 mi. Barry Co., $32,199; chat surfacing 3.59 mi. Lawrence Co., $12,756—to M. E. Gillioz, Monett, 3.239 mi. Benton Co., $5,086; chats surfacing 4.712 mi. Bates Co., $33,751; culvert Bates Co., $1,816—to W. F. Fogelman, O'Fallon, grading 1.667 mi. Texas Co., $10,136 — to Knutson Bros., 3520 Main St., Kansas City, 7.207 mi. Atchison Co., $33,073—to L. Gray, St. Louis, 5.991 mi. St. Louis Co., $114,407—to Davis Constr. Co., Boonville, grading, concrete surfacing 2.488 mi. Pettis Co., $53,759—to Nevada Constr. Co., Nevada, 0.345 mi. Vernon Co., $22,081—to E. L. Markham, Cape Girardeau, 0.542 mi. Dunklin Co., $10,696; 2.072 mi. New Madrid Co., $25,189—to W. A. Ross Constr. Co., Northwest 25th and Summit Sts., Kansas City, 3.327 mi. Jackson Co., $65,971; 3.654 mi. Jackson Co., $91,178—to R. H. Sharp, Reed Spring, graveling 3.466 mi. Cedar Co., $28,962—to C. W. Rose, Brookfield, 4.485 mi. Livingston Co., $14,515 — to Richmond Constr. Co., Advance, 4.347 mi. Stoddard Co., $12,663—to Kelly & Underwood, Granby, 3.718 mi. Shannon Co., $35,206—to L. W. Hayes, Bethany, 12.975 mi. Pettis Co., $24,695—to C. H. Atkinson Paving Co., Watertown, S. D., 4.563 mi. Schuyler Co., $17,979 — to R. B. Potashnick, Cape Girardeau, 5.283 mi. Scott Co., $13,316; 5.569 mi. Ripley Co., $28,109; 1.338 mi. Mississippi Co., $4,697—to Sitton Truck Transportation Co., Kansas City, 6.598 mi. Platte Co., $1,702—to Service Constr. Co., Poplar Bluff, 7.082 mi. Iron Co., $132,844—to H. D. Thomas, Fulton, 4.015 mi. Montgomery Co., $21,513—to Kiefner & Giele Constr. Co., Perryville, 5.58 mi. Stoddard Co., $34,707—to H. H. Ruddell, Springfield, 5.524 mi. Pettis Co., $19,153—to J. A. Kerr, Ozark, 6.034 mi. Laclede Co., $43,432; 1.98 mi. Dallas Co. $13,019; 4.943 mi. Greene Co., $33,511—to C. P. O'Reilly Constr. Co., St. Louis 5.969 mi. Jefferson Co., $8,740. Grand total $1,683,369. Noted Sept. 18. Rejected bids constructing roads in Mississippi, Ozark, Howell, Monroe, Lewis and Ralls Counties. Noted Sept. 18.

Missouri—State Hy. Bd., Jefferson City, to Sitton Truck Transportation Co., Kansas City, stone surfacing 11.192 mi. Saline Co., $19,158—to Neyer Constr. Co., Billings, chat surfacing 4.116 mi. Dade Co., $24,914—to Maxwell Constr. Co., Columbus, Kan., 5.965 mi. Jasper Co., $29,055—to Kelly & Underwood, Granby, 8.763 mi. Newton Co., $37,585—to List-Clarke Constr. Co., 416 Railway Exch. Bldg., Kansas City, 3.769 mi. Clay Co., $40,068—to Bunnell & Mack Constr. Co., Paragould, Ark., 8.359 mi. Madison Co., $23,339—to Wisconsin Bridge & Iron Co., Milwaukee, Wis., 6.81 mi. Camden Co., $20,527—to W. K. Ferman & Co., LaPlata, 1.763 mi. Knox Co., $6,729—to J. Kesl & Son, Edwardsville, Ill., 0.553 mi. Butler Co., $10,788—W. D. Knoll, Gainsville, 5.448 mi. St. Clair Co., $26,614—to R. E. Martin, Nashville, Tenn. 0.873 mi. McDonald Co., $6,833—to F. T. O'Dell, Hannibal, 1.957 mi. Audrain Co., $10,438—to C. E. Rich & Co., Troy, 4.713 mi. Washington Co. $26,646—to Samples & Elsea, Kirksville, graveling 9.871 mi. Macon Co., $38,090—to M. Wunderlich, St. Paul, Minn., 8.128 mi. Wright Co., $72,873—to M. E. Gillotz, Monett, 7.952 mi. McDonald Co., $96,635—to Knutson Bros., 3520 Main St., Kansas City, 1.736 mi. Gentry Co., $10,779. Grand total $501,071. Noted Oct. 2.

Mo., Clayton—St. Louis Co., Court House, concrete paving 15,500 ft. Smizer Mill Rd., to C. A. Moreno, Syndicate Trust Bldg., St. Louis, $108,912—Ballas and Ladue Rds., to W. C. Meneely, Rural Route, Clayton, $146,858 and $79,011 respectively — 3,435 ft. Greenwood Blvd., to Webb-Boone Paving Co., 5103 Fyler Ave., St. Louis, $39,759. Grand total $374,540. Noted Oct. 2.

Nebraska—Dpt. P. Wks., Lincoln, to Sherman County, Loup City, grading 9.6 mi. road in Sherman Co., $23,455—to Diamond Eng. Co., Grand Island, culverts, driveways Sherman Co., $14,504; culverts Hall Co., $2,884; grading 6.3 mi. Hall Co. $15,461; bridges Hall Co., $11,860—to Dobson & Robinson, Lincoln, paving 6.3 mi. Hall Co. $109,261—to Western Asphalt Paving Corp., 2100 East 4th St., Sioux City, Ia., culverts, driveway pipe Hall Co., $894; driveway pipe Hall Co., $36—to Montan Constr. Co., 2915 North 16th St., Omaha, grading 7.2 mi. Hall Co. $12,304. Grand total $190,659. Noted Oct. 2.

Nebraska — State Hy. Dpt., Lincoln, and Douglas Co. (Omaha) grading, concrete paving 4.8 mi. Maple Street Rd., 20 ft., to Yant Constr. Co., Omaha Natl. Bank Bldg., Omaha, $100,837.

Neb., Omaha—City, to L. S. Noble Constr. Co., 1530 South 10th St., improving Dist. 3408, Young St., 265 sq. yd. art stone at $2.39 per sq. yd., 227 ft. art stone guttering and curbing, $0.68 per ft., 64 headers $0.40 each, and 125 cu. yd. grading $0.65 per cu. yd.; paving Dist. 3449, 665 sq. yd. B art stone $1.57, 10 headers $0.40, 275 cu. yd. grading $0.70—to J. Kearns Constr. Co., 712 Union Bank Bldg., Omaha, art stone in Dists. 3406 and 3407, $2.40—to J. J. Parks Co., 205 Bankers Savings Bldg., improving Dist. 3444, 548 sq. yd. asphalt paving $2.71, asphaltic concrete paving $2.42, vitr. brick paving $3.27, art stone paving $2.27, 3 cu. yd. retaining wall, $14.67 ft. curbing and guttering $0.67, 200 cu. yd. grading $0.63; asphalt paving Dist. 3456 $2.71, asphaltic concrete paving $2.42, vitr. brick paving $3.27, art stone paving $2.27, 2,101 ft. curbing and guttering $0.67, 96 headers $0.40, 550 cu. yd. grading $0.63—to P. McArdle, 1901 Park Ave., art stone paving 1,818 sq. yd., Alley Projects 3072, 3426 and 3441 $1.65, curbing and guttering 32 ft. $0.80, 400 cu. yd. grading at $0.60—to F. L. Busche, 4118 North 30th St., paving intersection at Deer Park Blvd. and Vinton Ave. and A St. and Dahlman Ave., 308 sq. yd. asphaltic concrete paving $2.50, 333 ft. curbing and guttering $0.68, 36 ft. headers $0.40, grading 622 cu. yd. $0.59—to H. J. Peterson Co., 303 Baum Bldg., retards in

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Streets and Roads (Continued)

Spring Lake $3,185; storm sewers in Dist. 1077 $1,528.

Nevada — Directors Dpt. Hys., Carson City, road in Ormsby and Lyon Counties, to Dodge Bros., Inc., Fallon, $43,842; furnishing corrugated metal pipe culverts and band couplings for above project, to Flanigan Warehouse Co., Reno, $2,382. Noted Oct. 2.

N. J., Bridgeton—Bd. Freeholders Cumberland Co., constructing roundpoint or traffic circle in Landis Ave., Landis Twp., to C. D. Prosser, Pitman, $27,729.

N. J., Raritan—Bd. Twp. Comn., Township Hall, curbing, bituminous macadam paving Old Post Rd., to Utility Constr. Co., 5 Spring St., New Brunswick, $22,369. Noted Oct. 17 Daily.

N. J., Trenton—Bd. Freeholders Mercer Co., Court House, paving Prospect St., Ewing Twp., to Union Paving Co., Broad and Stiles Sts., Phila., Pa., $31,747.

New York—**A.** W. Brandt, comr. Hys., Albany, concrete paving 0.97 mi. road in Herkimer Co., to C. D. Murray, 701 Westcott St., Syracuse, $46,415 est. $62,788—1.28 mi. Clinton Co., to R. E. Tompkins, Rochester, $119,633 est. $156,083—road in Rensselaer Co., to New Haven Road Constr. Co., Inc., 1827 Dixwell Ave., New Haven, Conn., $482,917 est. $749,926—0.63 mi. Westchester Co., to F. Lux, 694 Milton Rd., Rye, $80,899 est. $114,130—0.07 mi. Westchester Co., to Hudson River Fill Co., Inc., New York, $14,367 est. $20,591—6.95 mi. Wyoming Co., to Rochester Concrete Constr. Co., Inc., 466 Clinton Ave. S., Rochester, $269,253 est. $380,379—5.03 mi. Suffolk Co., to Stanley Constr. Co., Astoria, $374,675 est. $529,641 — 0.42 mi. Dutchess Co., to J. DeMichael Bros., Torrington, Conn., $20,650 est. $24,373 — 4.63 mi. Westchester Co., to Miller Bros. Constr. Co., Inc., 151 Earl St., Hartford, Conn., $493,912 est. $707,312—6.12 mi. Otsego Co., to Belmar Constr. Co., Inc., Proctor Bldg., Troy, $279,742 est. $392,254—graveling 0.38 mi. Lewis Co., to W. Van Kleeck, New Paltz, $25,925 est. $45,335—bituminous macadam paving 4.12 mi. Ulster Co., to I. V. A. Huie, Inc., Saugerties, $269,483 est. $370,050—6.01 mi. Erie Co., to C. W. Wood, 232 Delaware Ave., Buffalo, $16,382 est. $22,382—0.76 mi. Washington Co., to Bird, McClary & Bird, Syracuse, $57,377 est. $68,817—1.24 mi. Washington Co., to D. S. Trowbridge, Inc., Ticonderoga, $35,733 est. $46,158—5.56 mi. Tompkins Co., to Mayers Bros. Constr. Co., Erie, Pa., $213,168 est. $294,376—1.74 mi. Onondaga Co., to Dale Eng. Co., 404 Court St., Utica, $146,034 est. $206,682. Grand total $2,946,565. Noted Aug. 14. Sect. 11 and 25.

New York—Westchester Co. Park Comn., 72 West Pondfield Rd., Bronxville, grading, paving 1.9 mi. Central Westchester Parkway, in Harrison, North Castle and White Plains, to A. Riegel & Son, Brockway Pl., White Plains, $158,354. Noted Sept. 18.

N. Y., Brooklyn—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, to Uvalde Asphalt Paving Co., Metropolitan Ave., asphalt paving Bushwick Ave., $13,853—to Brooklyn Alcatraz Asphalt Co., 407 Hamilton Ave., Clinton Ave. $52,249; Pacific St. $41,830; 10th Ave. $22,087; 18th St. $49,221; 57th St. $42,918—to D. J. McCoy Asphalt Co., Avenue and East 57th St., Cook St., $27,886. Grand total $250,044. Noted Sept. 25.

N. Y., Brooklyn—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, asphalt paving Beverly Rd., to M. J. O'Hara, Neptune Ave. and West 19th St., $15,064—grading East 27th St., to Concrete Co., Metropolitan Ave., $1,987—granite block paving Greenpoint Ave., L. B. Harrison & Co., 189 Montague St., $22,647—Serman and 23rd Aves., to B. Turecamo, New Cropsey Lane, $7,344 and $2,584 respectively. Grand total $50,526. Noted Oct. 2.

N. Y., New York—H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., to C. D. Beckwith, Inc., Seneca Ave. and Edgewater Rd., bituminous concrete paving 232nd St., $10,545; East 231st St., $7,406; asphalt paving Van Courtland Park $25,986; Matthews Ave., $29,734; Evergreen Ave. $14,271; Wilder Ave. $18,223; Harrington Ave. $18,588—to St. George Paving Co., 415 Lexington Ave., granite block on concrete paving East 139th St., $26,455—to Clay Contg. Co., Benson St., $5,977—to Coddington Ave. Contg. Co., Hammersley Ave., $4,767—to F. Gabriel, 2750 Creston Ave., East 232nd St. $6,364—to C. Turiano Contg. Co., regulating Holland Ave., $6,079. Grand total $174,395. Noted Oct. 2.

N. Y., New York—J. Miller, pres. Manhattan Boro, Municipal Bldg., grading, asphalt paving Chrystie St. and Bway., to A. J. O'Brien, Inc., 14 East 42nd St., $121,953 and $21,437 respectively; West 89th St., to C. D. Beckwith, Inc., Seneca Ave. and Edgewater Rd., $13,939. Grand total $157,327. Noted Oct. 2.

Ohio—R. N. Waid, dir. hys., Columbus, surface treating 2.309 mi. Cincinnati-Batavia Rd., Clermont Co., to A. C. Pickelheimer, Newtonville, $32,217. Noted Sept. 18.

O., Canton—Grading, oil asphalt paving 1 mi. Gross Ave., N. E. from 12th to 19th Sts., 40 ft., to General Asphalt Paving Co., Witters Bldg., Cleveland Ave., N. W., $69,993. Est. $75,000.

O., Cincinnati—Grading, granite curbing, sheet asphalt on concrete paving 5,000 sq.yd. 8th St. from Elm St. to Central Ave., 34 ft., to Scully Bros., 1011 Atlas Bank Bldg., $21,717. Est. $25,668.

O., Cleveland — Paving Amwell Ave., to Gould & Maybach, 16311 Saranec Rd., $4,007—East 38th St., to Freshwater Constr. Co., Davis & Farley Bldg., $18,960 — resurfacing Hamilton Ave., to Cleveland Trinidad Paving Co., Western Reserve Bldg., $58,583. Grand total $81,550.

O., Dayton — Widening, asphalt on concrete paving Wilkinson St. from 3rd to Court Sts., and from 5th to Court Sts., to Republic Asphalt Paving Co., North Summit St., $26,159. Est. $35,000.

O., Lisbon—Columbiana Co., grading, waterbound macadam paving Teegarden-Franklin Square Rd. at intersection Salem-Lisbon Rd. and continuing east to paved road in Franklin Sq., to E. E. Miller & Son, Canfield, $26,904. Est. $25,000.

O., Middleburgh Heights (br. Cleveland) — Village, concrete curbing, concrete paving Briar Cliff Parkway and Lanier Dr., to J. C. Fischer, 16024 Lorain Rd., Cleveland, $16,734 and $14,137 respectively.

Oklahoma—State Hy. Dpt., Oklahoma City, grading, drainage structures 21.6 mi. Federal Aid Project 220-E, F and G, Texas Co., to T. C. Ottinger, Hinton, $51,396 est. $60,000: 3.798 mi. State Aid Project 675-A, Okmulgee Co., to Schultz Constr. Co., Ozark, Ark., $17,326 est. $25,000, both 36 ft. wide. Noted Oct. 1.

Pa., East Pittsburgh—R. G. Woodside, controller Allegheny Co., clearing right-of-way, incl. removing 8 buildings, retiring 85 buildings or parts of buildings, to G. Miller, Pittock, $19,972. Noted Sept. 25.

Pa., Elwood City—L. W. Monroe, city mgr. and engr., concrete approaches, curbs to viaduct, to A. Dahl, 425 Wayne Ave., $23,000. Est. $30,000. Noted Sept. 18.

Pa., Phila.—Bureau Hys., Dpt. P. Wks., A. Murdock, dir., City Hall Annex, to Marino Massee, 3936 North Reese St., grading Cheltenham St., $3,014—to T. H. Neely, 2730 Federal St., Dudley and Etting Sts., $694—to T. P. Lee, 5629 Cherry St. Laycock St., $2,509—to Union Paving Broad and Stiles Sts., asphalt paving (assessment work) Allen, Bath, Balfour and Kingston Sts., $12,740; Comly St. $36,286; Conlyn and 20th Sts. $2,856; Battersby St. $5,484; Bingham St. $3,339; Edmund St. $4,179; G St. $16,065; Greenway St. $14,638; Griscom St. $4,677; Grovers St. 8,068; Howell St. $29,815; Ithan and 57th Sts. $16,367; Lakeside St. $11,465; Media St. $3,652; Midvale St. $34,189; Princeton St. $33,732; Ruscumb St. $5,418; Rutland St. $4,188; Sherwood St. $9,271; Stenton St. $8,876; Thorps St. $13,417; Vankirk St. $21,147; Venango St. $5,021; 9th St. $12,777; 13th St. $5,586; 18th St. $2,603; 59th St. $4,142; 60th St. $6,019; improving Frontenac Rd. $13,673; asphalt repaving Bouvier St. $2,818—to Eastern Asphalt Co., Penna Bldg., asphalt paving (assessment work) Church Lane $5,684; Eastburn St. $2,842; intersection Elmwood and Island Aves. $2,233; Fayette and Upsal Sts. $1,228; Mutter St. $1,330; Waterloo St. $1,906; Wishart St. $2,023; 16th St. $2,320; improving Dearnley Rd. $5,827; redressed granite block repaving Eadom St. $1,469; Thompson St. $9,128—to Municipal Contg. Co., Washington Square Bldg., asphalt paving (assessment work) Narragansett St. $1,170—to Montgomery Paving Co., Harrison Bldg., Oxford St., $11,410—to F. L. Curtis, 6736 State Rd., grading, improving Overhill Ave. from Bustleton Ave. to County Line Rd., $18,073—to G. F. Dobbin, 1020 South 47th St., furnishing, delivering fabricated structural steel for Kensington Avenue Bridge 166, $1,270. Grand total $426,438. Noted Oct. 1.

Pa., Stockdale—P. F. Lambert, boro pres., curbing, guttering sewers, grading, concrete paving 9,165 sq.yd. Bow, Chestnut, Railroad and Locust Sts., to T. Arrigo, 906 Fallowfield Ave., Charlerol, $43,000. Noted Oct. 2.

Tex., Dallas—Comrs. Court Dallas Co., grading, drainage structures on Industrial Blvd. from Corinth St. to Turtle Creek Blvd., to Gifford Hill & Co., North Texas Bldg., $78,402.

Tex., Houston—For 1½ in. asphalt on 6 rein.-con. paving North MacGregor Dr. from Scott to Ennis Sts., to Brown & Root, Post-Dispatch Bldg., $48,279; grading, grubbing same street, to C. K. Horton, Box 1394, $16,663.

Tex., Point Isabel—Paving 1 mi. streets, to Dodds & Wedegartner, San Benito, $58,000.

Washington—S. H. Holmes, dir. State Hys., Olympia, grading 2.169 mi. Kittitas Co. and 1.125 mi. Asotin Co., to Morrison Knudsen Co., Boise, Idaho, $145,269 and $45,854 respectively —4.856 mi. Lewis Co., to Gordon W. Marsh, Inc., Columbus Bldg., Chehalis, $37,383—4.962 mi. Kitsap Co., to J. Otteson Co., Inc., 3804 Hanford St., Seattle, $84,972—concrete paving 7.537 mi. Pierce Co., to J. Warter Sr., 631 North Fife St., Tacoma, $69,834—grading, concrete paving 1.529 mi. Snohomish Co., to Norris Bros., Burlington, $11,986—1.83 mi. King Co., to R. G. Stevenson, 1327 Northlake Ave., Seattle, $31,647. Grand total $426,945. Noted Sept. 25.

W. Va., Wayne—Wayne Co., improving Big Sandy Rd., Projects 162 and 141, to S. C. Isaacs & Son, West Hamlin, $34,095.

Ont., Toronto—City Council, City Hall, asphalt paving Ranleigh Ave., to Rayner Constr. Co. Ltd., 159 Bay St., Toronto, $14,195 — bitulithic paving Glengrove Ave., to Warren Bituminous Paving Co. Ltd., 74 University Ave., $29,072—Ranleigh and Deloraine Aves., to Asphaltic Concrete Co. Ltd., Sun Life Bldg., $6,993 and $5,211 respectively—grading Rosewell Ave., to J. Martello & Co., 16 Stralhearn Blvd., $958. Grand total $56,429.

Ont., Toronto — Asphalt repaving Humber Blvd., to Asphaltic Concrete Co. Ltd., Sun Life Bldg., $23,620; asphalt paving Fleet St., to Rayner Constr. Co. Ltd., 159 Bay St., $27,971.

Ont., Westport—Town, asphalt paving 11,000 sq.yd. Church, George and Spring Sts., to Holmes & Jamieson, Kemptville. Est. $40,000.

Que., Low—Hull Twp., constructing 3 mi. Fieldville Rd., 3 mi. Stacksburn Rd., 1 mi. Barry-Sullivan Rd., 1 mi. Pike Lake Rd., to Laflamme & Laflamme, 363 Sherbrook St., Montreal, $46,500. Noted Sept. 11.

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EXCAVATION, DRAINAGE, IRRIGATION, LEVEES, RIVER AND HARBOR

PROPOSED WORK

Ind., Washington—Bd. Comrs. Daviess Co., 27.3 mi. levee, incl. 1,375,150 cu.yd. dry earth excav., 41 flood gates. $215,045. W. J. Shanks, Washington, engr.

Ind., Winamac—Bd. Comrs. Pulaski Co., constructing 20 mi., Monon Ditch. $200,000. R. E. Wilson, Winamac, aud.

Tex., Edinburg—Hidalgo Co. Water Impvt. Dist. 13, c/o A. W. Cameron, judge, granted petition to form district, and plans election $1,500,000, concreting all canals, constructing drainage system on 20,500 acre tract.

Wyo., Lucerne—Lucerne Irrigation Dist., preliminary plans ditches, reservoir, installing pumping equipment to irrigate 2,800 acres land. $46,962. H. F. Bell, Cody, engr.

Ont., Kingston—Extending concrete breakwater, King St. W. $25,000. H. S. Dick, city engr.

Que., Montreal—Montreal Harbor Comn., 357 Common St., expending $2,000,000 during next 6 months, improving harbor, incl. reconstructing downstream side of King Edward Pier, foot of St. Lawrence Blvd., est. $1,500,000; constructing new 2 story shed on pier, incl. several grain conveyor galleries; extending McColl-Frontenac Wharf to 3 times its present length, and reconstructing Laurier Pier in eastern part main harbor.

BIDS ASKED

Calif., Modesto—Bd. Directors Modesto Irrigation Dist. bids about Oct. 27, 131,500 sq.ft. 2½ in. and 6,500 sq.ft. 2 in. concrete canal lining, miscellaneous structures. District will furnish ad-mixture, reinforcing steel and aggregates for concrete work.

Calif., Paradise—Nov. 4, by J. E. Alley, secy. Paradise Irrigation Dist., furnishing 80 ft. 30 in. 10-gage riveted steel slip-joint pipe, 40 bbl. portland cement, 20 cu.yd. sand, 40 cu.yd. gravel, 220 ft. 4 in. standard screw-joint pipe, 30 in. L.P. Heavy-Duty gate, Calco model or similar, pedestal lift rod, 5,000 ft. b.m. dimension lumber, hauling all materials from Magalia station to job, damming water from tunnel, installing 30 in. pipe, welding 30 in. gate to pipe, filling tunnel with concrete over pipe and balance with loose rock, constructing bulkhead, intake, screen support, building operating trestle, installing pedestal lift.

Calif., Indio—Nov. 1, by Trustees Coachella Valley Storm Water Dist., Riverside Co., excavation channels, incl. 55,000 cu.yd. excav. G. N. Adams, Rowan Bldg., Los Angeles, engrs.

Ind., Winamac — Nov. 1, by Bd. Comrs. Pulaski Co. 5 mi. M. P. Hill Ditch in Pulaski, Salem and Monon Twps., incl. 252,869 cu.yd. excav., 10,821 cu.yd. hard pan. $35,000. A. Goodman, Winamac, engr.

La., Hammond — Nov. 14, by Bd. Comrs. Tangi D.D. 1, Tangipahoa Co., gravity drainage system, incl. excavating drainage channels, clearing, cleaning natural stream channels, constructing concrete, timber bridges. $65,000. E. G. Freiler, Hammond, engr.

N. Y., New York—Oct. 28, by M. Cosgrove, comr. Docks, Pier "A," Battery Pl., North River, dredging between East 100th and East 120th Sts., Harlem River, Contr. 1993.

Wash., Wenatchee—Howard Flat Dist., Irrigation Project, bids about Nov. 18, irrigation project, incl. 5 mi. 6- to 22-in. pipe line, 11,000 g.p.m. electric pumping plant, Chelan Co., near here. $300,000. W. T. Batcheller, Dexter Horton Bldg., Seattle, engr. Noted Oct. 9.

CONTRACTS AWARDED

Calif., Merced — Merced Irrigation Dist., 524,000 sq.ft. 2 in. concrete canal lining, to Alldrin & Anderson, P. O. Box 222, Turlock, $37,471; drilling, casing wells, to Osterberg Bros., Modesto. Noted Sept. 25.

Calif., Turlock—**A.** Sorensen, secy. Turlock Irrigation Dist., to Alldrin & Anderson, P. O. Box 222, 54,000 sq.ft. 2 in. canal lining, $3,645; to Pacific Properties & Constr. Co., 3747 Woodruff Ave., Oakland, 171,076 sq.ft. 2 in. concrete canal lining $16,868, 64 concrete check gates (58.78 cu.yd.) $941, 34 concrete structures (42.06 cu.yd.) $589. Grand total $22,043. Noted Sept. 25.

Ill., Edwardsville—Bd. Comrs. County Ditch Drainage & Levee Dist. Madison Co., c/o C. W. Burton, 303 Edwardsville Bank Bldg., 52,000 cu.yd. excav. in ditches, to M. J. O'Meara, W. C. Bldg., Quincy, at $0.0962 per cu.yd., two 72 in. automatic drainage gates complete, to C. F. Mindrup & Son, Edwardsville, $2,082. Noted Jan. 9.

Ill., Wood River—Bd. Comrs. Wood River Drainage & Levee Dist., J. H. Chessen, secy., 24 East Ferguson Ave., clearing, grubbing, changing channel East Fork of Wood River, Southwest Quarter of Sect. 10, Twp. 5, North Range 9 West Madison Co., incl. 4,500 cu.yd. excav., to Hanks & Blair, East Alton, at $0.20 per cu.yd.

Miss., West Point—Comrs. Cane Creek D.D. 2, drainage ditch, incl. 38,00 0cu.yd. excav., to V. L. Harris, Houston, at $0.875 per cu.yd. Noted Sept. 25.

Excavation, Drainage, Irrigation, Levees (Cont.)

N. Y., Bayshore — Town, enlarging public dock, Maple Ave., and dredging channel, to Gibson & Cushman, Bayshore, $13,164.

Public Bond Elections

Coming Bond Elections

Filtration Plant — Wilmette, Ill., Nov. 4, 700,000.
Waterworks—Colfax, La., Nov. 18, $25,000.
Waterworks Ext., Dam, etc. — Ridgway, Pa., Nov. 4, $150,000.
Waterworks Impvts.—Turtle Creek, Pa., Nov. 4, $150,000.
Waterworks Impvts.—Midvale, Utah., Oct. 28, $125,000.
Sewers, Disposal Plant, Extending, Widening, Relocating Streets — Cleveland, O., Nov. 4, $21,500,000.
Sewers, Disposal Plant, etc.—Blanchard, Okla., $30,000.
Drainage System, Canals, etc.—Hidalgo County, Tex., Water Impvt., Dist. 13, $1,500,000.
Bridges — Cuyahoga County, O., Nov. 4, $6,000,000.
Pedestrian Tunnel—Glendale, Calif., $125,000.
Harbor Impvts., etc. — San Francisco, Calif., $10,000,000.
Port Impvts.—Bellingham, Wash., Nov. 4.
Park Impvts. and Swimming Pool — Trenton, Mo., $40,000.
Park Impvts.—Cleveland, O., Nov. 4, $500,000.
Schools—Albany, Calif., $150,000.
School—Plaquemine, La., Nov. 18, $175,000.
Light and Power Plant—Colfax, La., Nov. 18, $40,000.
Hydro-Electric Plant — Mount Pleasant, Utah, Nov. 4, $40,000.

Bonds Voted

Waterworks Impvts. — Thomasville, Ala., $21,000.
Pumping Station, Purification Plant, Mains, etc.—Grand Forks, N. D., Burns & McDonnell, Kansas City, Mo., Engrs., $225,000.
Waterworks Impvts., Inc., Purchase Present System—Point Isabel, Tex., $139,250.
Sewage Disposal Plant — Kingfisher, Okla., C. R. Steele, Engr., $25,000.
Sewage and Disposal Plant — Point Isabel, Tex., $48,500.

Bonds Defeated

Waterworks—Lookeba, Okla., $15,000.
Bay Front Beautification, Inc., Sea Wall, Fill, etc.—Corpus Christi, Tex., $1,650,000.

FEDERAL GOVERNMENT

PROPOSED WORK

Calif., Oakland — DREDGING — U. S. Eng., San Francisco, 691,074 cu.yd. in Oakland Harbor.

Calif., Sacramento — LEVEE — U. S. Eng., California Fruits Bldg., levee, 114,000 cu.yd. embankment, at Moulton Landing.

Ill., Chicago—POST OFFICE—Treas. Dpt. at office Sup. Archt., plans by Graham, Anderson, Probst & White, 80 East Jackson Blvd., 10 story, post office, Van Buren and Canal Sts.

Minn., Hastings—SAND FILL—U. S. Eng., St. Paul, sand fill for roadway and esplanade at Locks and Dam.

Missouri—REVETMENT, etc.—U. S. Eng., Kansas City, 3,900 lin.ft. revetment and 16,100 ft. levees in Missouri River; 6,180 ft. dikes and 4,800 ft. revetment in Missouri River to mouth.

Tex., Randolph Field — QUARTERS — Con. Q.M. soon takes bids eleven 2 story, 32 x 44 ft. field officers quarters, Herbert S. Green, c/o Alamo Natl. Bank Bldg., San Antonio, archt.; seventeen 2 story, 32 x 40 ft. company officers quarters, J. Marriott, Natl. Bank of Commerce Bldg., San Antonio, archt.

BIDS ASKED

California — ROAD — Mar. 10, by C. H. Sweetser, dist. engr. Pub. Rds., 461 Market St., San Francisco, bituminous treating 29.77 mi., and surfacing 7.71 mi. Sects. A, B, C, D and E, Route 1, Loop Route Lassen Volcanic Natl. Park Roadway, Tehama Co.

Calif., Richmond—DREDGING, etc.—Nov. 13, by U. S. Eng., San Francisco, 94,340 cu.yd. dredging, and 195,000 cu.yd. sand for making fill in Richmond Harbor, Contra Costa Co.

Calif., Sacramento—ROAD—Oct. 29, by U. S. Eng., California Fruit Bldg., raising 21,750 ft. raised levee along west side of Yolo By-Pass, Sacramento and Yolo Counties.

D. C., Wash. — CRANE RUNWAY — Spec. 6316—Oct. 29, by Yards & Docks, Navy Dpt., structural steel crane runway, at Navy Yard.

D. C., Wash.—GRANITE TERRACES—Nov. 10, at office D. Lynn, archt. of Capitol, constructing granite terraces, balustrades, approaches, Senate Office Building, Delaware Ave. and C St.; adv. E. N.-R. Oct. 23.

D. C., Wash.—IRON, STEEL, etc.—Oct. 29, by A. L. Flint, genl. purch. officer, Panama Canal, iron, steel, bronze rods, sheet brass, copper, aluminum and yellow metal, boiler plate zinc, sheet lead, etc., Schedule 2598.

Ga., Augusta—HOSPITAL—Nov. 11, by Vet. Bu., Arlington Bldg., 1 acute building, incl. grading, roads, walks, at U. S. Veteran's Hospital. H. W. Breining, acting dir.; adv. E. N.-R. Oct. 23. Noted Jan. 17.

Ky., Harrodsburg—POST OFFICE—Oct. 30, by Treas. Dpt. at office Sup. Archt., U. S. Post Office.

Ky., Louisville—FOUNDATIONS—Oct. 27, by Treas. Dpt. at office Sup. Archt., foundations for U. S. Post Office and Custom House.

Mass., Rutland Heights — INCINERATOR — Nov. 4, by Vet. Bu., incinerator building, additional requirement at U. S. Veteran's Hospital.

Mass., Vineyard Haven—HOSPITAL—Nov. 6, by Treas. Dpt. at office Superv. Archt., repairing attendants' quarters at U. S. Marine Hospital. Noted Oct. 2.

Mo., Osage City—DIKES—Oct. 31, by U. S. Eng. Office, Postal Telegraph Bldg., Kansas City, 8,270 lin.ft. standard pile clump dikes; 3,900 lin.ft. standard revetment, 16,280 lin.ft. levee work, along Missouri River, at Rising Creek Bend and Cote Sans Dessein Reach, 2.1 mi. from here.

N. J., Metuchen—QUARTERS—Nov. 12, by Con. Q.M., 5 houses for non-commissioned officers quarters; adv. E. N.-R. Oct. 23.

N. Y., Mineola—HOSPITAL—Nov. 14, by Con. Q. M., Mitchel Field, post hospital, at Mitchel Field; adv. E. N.-R. Oct. 23.

N. D., St. Johns—INSPECTION STATION—Nov. 18, by Treas. Dpt. at office Sup. Archt., U. S. Inspection Station.

Tex., Brownsville—FEDERAL—Treas. Dpt. at office Sup. Archt., bids about Jan. 15, 4 story, basement, brick, steel, rein.-con. federal building.

Tex., Mexia—POST OFFICE—Nov. 10, by U. S. Eng. U. S. Post Office.

Tex., Randolph Field—PUMPS—Nov. 14, at office Con. Q. M., furnishing, installing 4 deep well pumps, 3 booster surface pumps, equipment thereto; adv. E. N.-R. Oct. 23.

Wash., Seattle — FISHERIES BUILDING — Oct. 27, by J. Graham, archt., Dexter Horton Bldg., Seattle, 1 story, basement, 50 x 130 ft., brick, concrete, incl. office quarters, laboratory, library, on Lake Washington Canal, for U. S. Govt., J. R. Russell, field supt.

W. Va., Morgantown—POST OFFICE—Nov. 13, by Treas. Dpt. at office Sup. Archt., extending, remodeling (except elevator) U. S. Post Office; adv. E. N.-R. Oct. 23.

CONTRACTS AWARDED

Arizona — ROADS — Mar. 3, by C. H. Sweetser, dist. engr. Pub. Rds., 461 Market St., San Francisco, Calif., bituminous surfacing 9.97 mi. Grand Canyon Natl. Park-Bright Angel Springs-North Entrance on North Rim, Project 4; grading, bridging 8.4 mi. Sta. 0 plus 00 to Sta. 440 plus 53, Route 28, Housecock Canyon Natl. Forest Hy.

Connecticut—DREDGING—U. S. Eng., Providence, R. I., Duck Island Harbor, to Trimont Dredging Co., 10 State St., Boston, Mass., $63,541. Noted Aug. 14.

Conn., New London — PIERS — Yards & Docks, Navy Dpt., rebuilding piers at Naval Submarine Base, to Newport Contg. & Eng. Co., Inc., Lee Hall, $114,496. Noted Sept. 18.

Calif., San Francisco—TANK—Con. Q. M., Fort Mason, 50,000 gal. steel water tank on 55 ft. trestle at Fort Miley, to Chicago Bridge & Iron Wks., Rialto Bldg., $5,410. Noted Sept. 25.

Mo., Cape Girardeau—EARTHWORK— U. S. Eng., Memphis, Tenn., 1,900,000 cu.yd. earthwork in Little River Drainage Dist., near here, to W. E. Callahan Co., Railway Exch. Bldg., St. Louis at $0.1488 per cu.yd., total $291,648. Noted Oct. 2.

N. Y., Mineola—ROAD—Con. Q.M. constructing concrete road, Mitchel Field, to Gillford Constr. Co., Jamaica, $10,501.

Pa., Phila.—RIP RAP—U. S. Eng., rip rap and revetment in Delaware River, to General Contg. Co., Camden, N. J., $56,450. Noted Sept. 4.

Va., Quantico — HANGARS — Spec. 6274—Yards & Docks, Navy Dpt., relocating hangars, dismantling and storing hangar and towers, extending hangar at Marine Barracks (flying field), to Amer. Sheet Metal Corp., 2713 Colley Ave., Norfolk, $31,197. Noted Sept. 25.

Wis., Ashland — DREDGING — U. S. Eng., Duluth, Minn., 259,000 cu.yd. sandy clay in Ashland Harbor, to Duluth-Superior Dredge Co., 46th Ave. W., Duluth, Minn. Est. $65,000. Noted Sept. 25.

Wis., Lynxville—DREDGING—U. S. Eng., St. Paul, Minn., in Mississippi River, near here, to Minneapolis Dredging Co., 2429 University Ave. S. E., Minneapolis, Minn., $155,700.

RAILWAYS

PROPOSED WORK

Ontario—Toronto Transportation Comn., 35 George St., Toronto, extending Lansdowne Avenue car line to St. Clair Ave., construction of a loop, about 1 mi. double street (electric) railway in Toronto. $360,000. W. E. P. Duncan, 35 George St., Toronto, ch. engr.

BIDS ASKED

Ontario—See "Contracts Awarded."

CONTRACTS AWARDED

Texas—Fort Worth & Denver City Ry. Co., R. C. Gowdy, ch. engr., Denver, Colo., grading 1 mi., excavation cut, 50 ft. deep, in Amarillo, to Hamilton & Gleason, Tram Bldg., Denver, Colo.

Ontario—Canadian Pacific Railway, 60 Yonge St., Toronto, placing 100 mi. rock ballast between Toronto and London, day labor, $700,000. B. Ripley, Toronto, engr.

SUBWAYS AND TUNNELS

BIDS ASKED

Pa., Phila.—See "Sewers."

Pa., Phila.—Nov. 18, by Dpt. City Transit, C. E. Myers, dir., City Hall Annex, in Locust St. from 8th to 18th Sts. and 8th St. from Rushead to Locust Sts., incl. 5,667 lin.ft. 2 track subway, 3 passenger stations and underground passageway subways connecting 2 stations with South Broad Street Concourse, Contr. 303.

Ont., London—Dec. 1, by Canadian National Rys., T. T. Irving, ch. engr. (Central Region) Toronto, subways under tracks at Richmond and Wellington Sts. $600,000.

Ont., Kirkland Lake — Teck-Hughes Gold Mine Ltd., Kirkland Lake, subway on Goomb Rd. from shaft house to mine. $25,000. Private plans.

GRADE CROSSINGS

PROPOSED WORK

New Jersey—Bd. Freeholders Middlesex Co., County Records Bldg., New Brunswick, preliminary plans eliminating grade crossing by an underpass or overpass Pennsylvania R.R., one at Plainfield Ave., Raritan Twp., and one at Oak Tree Ave., Woodbridge Twp., $25,000 or more each. W. F. Buchanan, 175 Smith St., Perth Amboy, engr. Railroad will share cost.

N. J., Atlantic City—Bd. Freeholders Atlantic Co., Guarantee Trust Bldg., preliminary plans eliminating two grade crossings at Tilton Rd. intersections of Reading and Pennsylvania R.Rs. $25,000. A. H. Nelson, 741 Guarantee Trust Bldg., engr.

N. J., Wallington—Erie R.R. Co., G. S. Fanning, ch. engr., 30 Church St., New York, and State Hy. Comn., Trenton, preliminary plans eliminating grade crossing at Main St. $77,300.

N. Y., Amenia—New York Central R.R. Co., F. B. Freeman, ch. engr., 466 Lexington Ave., New York, eliminating Sin Patch or Benson Crossing, Dutchess Co. $100,000. Railroad pays $50,000. State $49,000 and County $1,000 toward cost.

N. Y., Elbridge—New York Central R.R. Co., F. B. Freeman, ch. engr., 466 Lexington Ave., New York, eliminating North Main St. Grade Crossing by constructing 2 bridges, one consisting 2 plate girder spans with 2 concrete approach spans at southerly and 3 at northerly ends over New York Central tracks, other consisting one plate girder span with 2 concrete approach spans at each end over West Shore tracks, about 500 ft. west of Jordon Station, Onondaga Co.

N. Y., Great Valley — Buffalo, Rochester & Pittsburgh R.R., E. F. Robinson, ch. engr., Rochester, eliminating crossings at Dugway Rd., Mutton Hollow Rd., Christian Hollow Rd. and Salamanca-Ellicottville Co. Hy. $250,000. Railroad pays $125,000 State $122,500 and County $2,500 toward cost.

N. Y., Hamburg—Erie R.R. Co., G. S. Fanning, ch. engr., 30 Church St., New York, elimnaiting Big Tree Rd. Crossing, on Buffalo-Hamburg Co. Hy., near Big Tree Station, $262,400.

N. Y., Newark—New York Central R.R. Co., F. B. Freeman, ch. engr., 466 Lexington Ave., New York, eliminating North Main St. and Mud Mill Rd. Grade Crossings by constructing 105 ft., 55 ft. and two short skew plate girder spans over the track, two 25 ft. rein.-con. approach spans on south end and five 20 ft. concrete approach spans on north end of bridge.

N. Y., Oswego—Erie R.R. Co., G. S. Fanning, ch. engr., 50 Church St., New York, eliminating Sawyer Crossing, 2 mi. east of Oswego Station, Tioga Co. $164,853.

N. Y., Spencer — Lehigh Valley R.R. Co., G. T. Hand, ch. engr., 143 Liberty St., New York, eliminating Tioga Street Crossing, Tioga Co. $121,200.

Ont., Port Credit—Town, concrete, steel subway under Canadian National Ry. at Center Rd., incl. grading. $50,000. Engineer not selected.

Ont., Toronto—City, Canadian National Ry. C. S. Gzowski, ch. engr., Montreal, Que., and Canadian Pacific Ry. Co., J. M. Fairbairn, ch. engr., Montreal, Que., grade separation on St. Clair Ave. W., incl. subways, under railroad tracks, steel spans with concrete abutments, piers and retaining walls. $1,500,000. R. C. Harris, City Hall, engr.

CONTRACTS AWARDED

Mich., Detroit—Wayne Co. Road Comn., 3800 Barlum Tower, rein.-con., steel viaduct at Miller Rd. and Michigan Central R.R. and Ford Motor Co. tracks, incl. excav., grading, paving constructing concrete abutments to J. W. Butler Constr. Co., Penobscot Bldg., $277,426.

DAMS

PROPOSED WORK

B. C., Rossland — West Kootenay Power & Light Co., dam 400 ft. high, on Pend Oreille River, in connection with hydro-electric scheme, $3,000,000 incl. power house, etc. L. A. Campbell, Rossland, engr.

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Dams (Continued)

BIDS ASKED

Calif., Los Angeles—See "Materials."

PIERS AND WHARVES

PROPOSED WORK

Que., Montreal—See "Excavation, Drainage, Irrigation, Levees, River and Harbor."

AIRPORTS

PROPOSED WORK

N. J., Orange—Chamber of Commerce Aviation Com., W. R. Fraser, chn., East Orange, preliminary plans airport, incl. grading, excavating, runway, etc. $25,000.

Tex., Kerrville—See "Hospitals."

GRAIN ELEVATORS

BIDS ASKED

Pa., Erie—GRAIN ELEVATOR—Pennsylvania R.R. Co., Broad St. Sta., 16th and Arch Sts., Phila., T. J. Skillman, ch. engr., W. D. Wiggins, in charge, Penn. Sta., Pittsburgh, taking bids 1,300,000 bu. grain elevator, 110 ft. high, 20 ft. diam., rein.-con., Bay St. end of Holland St. $300,000. Western Stevedoring Co., J. Thompson, pres., 1017 Commerce Bldg., lessee.

POWER AND LIGHTING

BIDS ASKED

Kentucky and Tennessee — See "Contracts Awarded."

New York—Nov. 11, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, block signaling and interlocking equipment, for portion Independent System of City-owned Rapid Transit Railroad, extending from 8th Ave. and 53rd St., Manhattan, to Roosevelt Ave., Queens, and from Nassau Ave., Brooklyn, to Queens Plaza, Queens.

N. Y., Brooklyn—Oct. 31, by J. J. Dorman, fire comr., Municipal Bldg., New York, portion underground fire alarm system, in Williamsburg Impvt. and in Greenpoint and Williamsburg Impvt.

CONTRACTS AWARDED

Kentucky and Tennessee—United Eastern Gas Corp., Barbourville, Ky., and Chattanooga, Tenn., 200 mi. gas pipe line from Barbourville, Ky., to Chattanooga, Tenn., extending through Pineville and Middlesboro, Ky., Knoxville and Eastern Tenn., with extension to Harlan, Ky., also drilling wells and developing 108,000 acres, day labor.

SPORTS AND PARKS

PROPOSED WORK

Mo., Trenton—City, L. M. Golloway, clk., election $40,000, swimming pool, park improvements.

N. J., Newark—Bd. Educ., City Hall, preliminary plans grading, excavating, retaining walls, drainage, for school site on High St. $25,000. C. F. Bertrand, City Hall, archt.

N. J., Newark—Bd. Educ., City Hall, rejected bids handball and tennis courts at west side high school playfield. $25,000. Will readvertise. C. F. Bertrand, Federal Trust Bldg., archt. Noted Aug. 8 Daily.

N. Y., Brooklyn—Manhattan Beath Bathing Parks, Inc., Ocean Ave. and Oriental Blvd., swimming pool, showers, grandstand, Shore Blvd. and Oxford St. To exceed $50,000. Private plans.

O., Salem—See "Schools."

Tex., Kerrville—See "Hospitals."

BIDS ASKED

La., New Orleans—See "Clubs."

CONTRACTS AWARDED

Conn., West Hartford (br. Hartford)—F. B. Rentschler, Albany Ave., 50 x 80 ft., concrete, stone swimming pool, to R. B. Swain, 75 Pearl St., Hartford. Est. $25,000.

N. Y., New York—Park Bd., W. R. Herrick, pres. Park Bd., Arsenal Bldg., rebuilding upper portion crib bulkhead at Thomas Jefferson Park, and installing wading pool in St. Gabriels Park, to Ross Galvanizing Wk., 389 Kent St., Brooklyn, $4,125 and $2,564 respectively; artificial granite concrete benches in Isham Park, to L. B. Harrison, 189 Montague St., Brooklyn, $862. Grand total $7,551. Noted Oct. 2.

Okla., Muskogee—Bd. Educ., J. Porter, pres., 110 x 153 ft., rein.-con., brick gymnasium for Central High School, to J. P. Wheat, Muskogee. Est. $85,000.

Pa., Washington—See "Schools."

HEATING AND VENTILATING

PROPOSED WORK

Conn., Storrs—Connecticut Agricultural College, C. C. McCracken, pres., renovating entire heating system, incl. central plant, new distribution. $400,000. Engineer not selected.

BIDS ASKED

Calif., Agnew—See "Hospitals."

N. J., Trenton—Oct. 29, by Dpt. Institutions & Agencies, State Office Bldg., installing mechanical stokers and water tube boilers at New Jersey State Prison. $5,000. Dpt. Architecture & Constr., State Office Bldg., engrs.

N. Y., Ossining—Nov. 11, by Commissioner Dpt. Correction, State Office Bldg., Albany, ventilators, assembly hall, Sing Sing Prison; adv. E. N.-R. Oct. 23.

CONTRACTS AWARDED

Me., Presque Isle—Presque Isle Hotels, Inc., heating and plumbing in hotel, to W. T. Smith, 477 Main St., Rockland. Est. $25,000. Noted Oct. 9, under "Hotels."

Mass., Boston—Western Union Telegraph Co., Congress St., heating and ventilating in office building, High and Congress Sts., to J. S. Cassidy, 133 Austin St., Cambridge, est. exceeds $25,000; plumbing, to C. H. Cronin, Inc., 14 Byron St., est. exceeds $25,000; electrical work, to Lord Electric Co., 303 Columbus Ave., est. $25,000 or more. Noted Apr. 17 under "Offices."

Mass., Holyoke—City, F. G. Burnham, mayor, City Hall, heating and ventilating in elementary school, Maple St., to Holyoke Supply Co., 210 Race St., $42,230; plumbing, to Roy Bros., 49 Cabot St., $10,000; electrical work, to Preston & Bishop, 237 Maple St., $17,711. Grand total $69,941. Noted Aug. 15 under "Schools."

N. H., Portsmouth—City, School Comn., heating and plumbing in Junior High School, Parrott Ave. and Rogers St., to J. F. Cabeen, 81 North St., Salem, Mass., est. exceeds $25,000; electrical work, to G. D. Fitts, 331 Common St., Lawrence, Mass., est. $25,000. Noted July 17 under "Schools."

UNCLASSIFIED

PROPOSED WORK

Arkansas — NATURAL GAS PIPE LINE — Southern Gas Co., Esperson Bldg., Houston, Tex., sketches 45 mi. natural gas line from Clarksville to Harrison, and vicinity. $400,000. Private plans.

Conn., Waterbury — CONCRETE MIXING PLANT—Waterbury Ready Mixed Concrete Co., c/o J. Delauretis, archt., 94 Benedict St., concrete mixing plant. $25,000 or more.

Okla., Elk City—GAS SYSTEM—City preliminary plans natural gas distribution system. $75,000. J. Hessler, Elk City, engr.

Tex., Brownsville—TOURIST LODGE, etc.—Boca Chica Beach Co., Boca Chica and Brownsville, plans by W. F. Brown, Brownsville, Spanish or Mediterranean type tourist lodge, concession building, galleries, at Boca Chica, near here.

Tex., Pampa — GAS PIPE LINE — Empire Companies, Bartlesville, Okla., 3¼ mi. 16 in. iron natural gas pipe line in field west of here. $30,000. Private plans.

Ont., Toronto — BLOWER SYSTEM — York Twp. blower system at Rockliffe Blvd. sewage disposal plant. $58,000. Gore, Nasmith & Storrie, Confederation Life Bldg., Toronto, consult. engrs.

BIDS ASKED

Ill., Chicago — DRIERS and DUST COLLECTORS—Oct. 28, by City, Dpt. P. Wks., City Hall, driers and dust collecting apparatus for Asphalt Plant 2, 3308 Belmont Ave. W. R. Wolfe, comr.

Mass., Taunton—COMFORT STATION—City, T. Scanlon, supt. buildings, City Hall, taking bids 1 story, brick, concrete comfort station. $25,000. Noted Oct. 2.

N. Y., Long Island City—STATION FINISH WORK—Oct. 31, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, station finish work in Queens Plaza, 36th, Steinway and 46th St. Stations of Rapid Transit R.R., Queens Boro. Former bids rejected. Noted Oct. 2.

N. Y., New York — ELEVATOR EQUIPMENT—Nov. 7, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., installing freight elevator equipment for 207th Street Shops, passenger elevator equipment in 181st and 191st Street Stations, passenger escalator equipment at 181st Street Station, of Independent System of City-owned Rapid Transit Railroads.

CONTRACTS AWARDED

Ill., East St. Louis—MARINE TERMINAL—Phillips Pipe Line Co., Phillips Bldg., Bartlesville, Okla., furnishing large storage tanks for marine terminal, incl. trunk, marine and tank car distribution terminal of tankage, tracks, office building, garage, housing facilities, ethyl blending plant, to Chicago Bridge & Iron Co., 37 West Van Buren St., Chicago. Noted May 22 under "Oil Pipe Line, Texas and Kansas, Contracts Awarded."

Mass., Boston—TANK—Quincy Market Cold Storage & Warehouse Co., T. Wharf, fuel oil storage tank for underground storage fuel oil, T. Wharf, to Aberthaw Co., 80 Federal St. Est. $25,000.

Mississippi—GAS PIPE LINE—Mississippi Power & Light Co., and Mississippi Gas & Electric Co., c/o T. M. Salisbury, Jackson, 48 mi. 8 in. lapwelded steel natural gas pipe line from Greensville to Greenwood, local distribution lines in Indianola, Moorehead and Greenwood, to Phoenix Utility Co., Pine Bluff, Ark. and 2 Rector St., New York. Est. $600,000 upwards.

Mo., St. Louis—SIGNAL SYSTEM—Missouri Pacific R.R. Co., E. A. Hadley, ch. engr., 13th and Olive Sts., 3 story, 21 x 45 ft., concrete, brick, steel interlocking tower at Carroll St., near approach to St. Louis Municipal Bridge, to Kellermann Contg. Co., 628 Buder Bldg. Noted July 3.

N. J., Freehold—Monmouth Co., Court House, timber bulkhead on Phalanx Rd., to S. S. Thompson Co., Inc., 170 Monmouth St., Red Bank. Est. $25,000. Noted Oct. 3 Daily.

Pa., Coverdale—COAL WASHING PLANT—Pittsburgh Terminal Coal Co., Wabash Bldg., coal washing installation at Mine 8, to Heyl & Patterson, Inc., 51 Water St., Pittsburgh. Est. $100,000.

MATERIALS

PROPOSED WORK

CEMENT — Merced, Calif., — Bd. Directors Merced Irrigation Dist., H. P. Sargent, secy., new bids in November, 4,000 bbl. cement. Former bids rejected. Noted Sept. 25.

BIDS ASKED

LEAD COVERED CABLE — Los Angeles, Calif.—Oct. 30, by T. Oughton, city purch. agt., 14,000 ft., 500,000 C.M., 5,000 ft. No. 2/0 AWG., 15,000 ft. No. 6 AWG, foregoing 5,000 volt; 15,000 ft. 1,500,000 CM, 12,000 ft. 1,000,000 CM, 20,000 ft. 500,000 CM, 30,000 ft. No. 4/0 AWG, 30,000 ft. No. 1/0 AWG, 25,000 ft. No. 4 AWG, 36,000 ft. No. 6 AWG, foregoing 600 volt lead covered cable.

REINFORCING STEEL—Los Angeles, Calif.—Oct. 27, by Surveys, Los Angeles Co., 1,000 lb. 1¼ in., 1,000 lb. 1¼ in., 8,000 lb. 1 in., 1,000 lb. ¾ in., 7,600 lb. ⅝ in., 2,900 lb. ½ in., 35,000 lb. ½ in., 11,500 lb. ⅜ in., and 1,000 lb. ¼ in reinforcing steel to be square deformed; 3,500 lb. 6 x 6 in. No. 8, welded wire fabric for Big Tujunga Dam 1.

PIPE, GATE, etc. — Paradise, Calif. — See "Excavation, Drainage, Irrigation, Levees, River and Harbors."

LUMBER and PILING—Knoxville, Ia.—Nov. 12, at office Auditor Marion Co., 6 carloads lumber and piling.

CAST IRON PIPE, etc.—Marblehead, Mass.—Town, Water Comn., taking bids c.i. pipe, special castings. To exceed $5,000. F. A. Barbour, Tremont Bldg., Boston, engr.

STRUCTURAL STEEL—Hattiesburg, Miss.—Nov. 4, by Bd. Supervs. Forrest Co., 65,850 lb. structural steel required for construction bridge over Black Creek. Address Hy. Engineer, Hattiesburg, engr.

LUMBER—Oxford, Miss.—Nov. 4, by Bd. Supervs. Oxford Co., 1 year supply creosoted lumber and bridge timbers.

WOOD PAVING BLOCKS—New York, N. Y.—Oct. 29, by P. J. Dooling, comr. Purchase, Dpt. Purchase, Municipal Bldg., creosoted wood paving blocks to Dpt. Plant & Structures.

CONTRACTS AWARDED

PIPE—San Francisco, Calif.—City, 2,500 ft. 12 in. c.i. pipe for Municipal Water Dpt., to Amer. Cast Iron Pipe Co., Balboa Bldg., at $1.298 per ft.

LUMBER and PILING—Leon, Ia.—Decatur Co., 300,000 ft. Douglas Fir lumber, 5,700 ft. red cedar, and 2,500 ft. treated yellow pine piling, to Lamoni Lumber Co., Lamoni, $9,427.

CRUSHED STONE, etc.—South River, N. J.—Boro Council, 700 tons ¾ in. crushed stone, to Raritan Mercantile Co., Perth Amboy, at $2 per ton; 10,000 gal. road tar, to American Tar Products Co., Koppers Bldg., Pittsburgh, Pa., at $0.15¼ per gal.

EQUIPMENT

PROPOSED WORK

TRUCKS and WAGON—Stockton, Calif.—San Joaquin Co. purchasing two 2-ton motor trucks and station wagon for Highway Maintenanace Dpt. W. Y. Tretheway, co. purch. agt.

ROAD OILER—Minneapolis, Minn.—Hennepin Co., A. P. Erickson, aud., purchasing one road oiler. $10,000.

TRUCKS — Minneapolis, Minn. — City, soon takes new bids 20 trucks for Street Dpt. Former bids rejected. N. W. Elsberg, city engr.

OIL DISTRIBUTOR—St. Paul, Minn.—G. J. Ries, aud. Ramsey Co., purchasing one 1,000 gal. oil distributor, $3,300; four 1½ ton trucks, $3,500; 5 ton truck chassis, $7,950. P. N. Coates, Guardian Life Bldg., engr.

PUMPING EQUIPMENT—Hominy, Okla.—Preliminary plans replacing present steam pumping equipment with Diesel engine driven pumping equipment. $30,000. Long & Co., 1300 Colcord Bldg., Oklahoma City, engrs.

PUMP—Yankton, S. D.—City, C. W. Summers, aud., authorized $1,700 for one pump.

BIDS ASKED

CONCRETE MIXER—San Francisco, Calif.—Oct. 27, by L. S. Leavy, city purch. agt., concrete mixer for Street Dpt.

CRANE—Chicago, Ill.—Oct. 29, by City, City Hall, heavy duty crawler crane, at Asphalt Plant 3, 91st and State Sts. R. W. Wolf comr. P. Wks.

BOILER EQUIPMENT—Boston, Mass.—Oct. 28, by Institutions Dpt., boiler equipment for Long Island Hospital, Long Island, Boston Harbor.

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Equipment (Continued)

TRUCKS—Hastings, Minn.—Nov. 17, by J. M. Langenfeld, aud., Dakota Co., one 3½- to 5-ton capacity truck.

TRUCKS—Winona, Minn.—Nov. 12, by A. Braeuelrien aud. Winona Co., one or more 3- to 6-ton trucks.

STOKERS—Trenton, N. J.—Oct. 29, by C. N. Leathem, engr., State Bldg., mechanical stokers and water tube boilers at New Jersey State Prison, for Dpt. Institutions & Agencies, State Bldg., Trenton. Est. $15,000.

ROAD BUILDING EQUIPMENT — **Brownsville, Tex.**—Nov. 10, by Cameron Co., c/o O. C. Dancy, judge, 1 crawler type tractor, 60 drawbar hp. or more; one 12 ft. leaning wheel grader; 1 crawler type motor grader with 128 blade.

ELECTRICAL EQUIPMENT, etc.—**Huntsville, Tex.**—Oct. 30, by State Bd. Control, C. Teer, chn., Austin, electrical equipment, sprinkling system equipment, heating equipment, plumbing and waterworks equipment for improvements at prison. Giesecke & Harris, Norwood Bldg., Austin, archts.

PRINTING PLANT EQUIPMENT — **Huntsville, Tex.** — Nov. 18, by State Bd. Control, C. Teer, chn., Austin, installing printing plant, incl. composing room, press room, and bindery equipment, for Texas Prison System.

FOREIGN

Mexico, Nuevo Laredo — City taking bids alternate types paving business and residential sections. $200,000. Address City Engineering Dept.

Mexico, Nuevo Laredo — City taking bids sanitary and storm sewerage system. $175,000. Address City Engineering Dept.

New Zealand, Wellington — Government soon takes bids national art museum. $1,000,000.

Buildings

RESIDENTIAL

BIDS ASKED

Calif., Alameda—J. S. Bereovich, Actico Bldg., Oakland, taking bids 7 story, basement, steel, rein.-con., Webster St. $300,000. T. Keenan, 1440 Bway., Oakland, archt.

Calif., Los Angeles—S. Gawecki, 6102 Saturn St., taking bids 9 story, basement, 55 x 115 ft., rein.-con., Beverly Blvd. $175,000 or more.

Calif., Los Angeles—M. P. Miller, archt., Bd. of Trade Bldg., taking bids 10 story, basement, rein.-con., Franklin St., for Cherokee Properties, Ltd., c/o architect.

N. J., South Orange—Morris Mandelbaum Associates, 7 East 42nd St., New York, revising plans and takes new bids about Nov. 1, two 3 and 4 story, basement, 50 x 200 ft., brick, steel, stucco, plain found., Kilburn Pl. and Irvington Ave. $350,000. Former bids rejected. Harris & Sohn, 17 Mechanic St., Newark, archts. Noted Aug. 28.

N. Y., Brooklyn—See "Contracts Awarded."

N. Y., Jackson Heights — See "Contracts Awarded."

N. Y., New York—See "Contracts Awarded."

Vt., Burlington—W. S. Appleyard, c/o Appleyard Motor Co., taking bids 7 story, basement, 100 x 150 ft., brick, steel, plain found., Summit St. $500,000. G. N. Meserve, 260 Tremont St., Boston, Mass., archt.

CONTRACTS AWARDED

Ill., Chicago—R. G. Ackley, 1447 East 63rd St., and 5132 Hyde Park Blvd., and T. R. Bishop & Son, archts., 35 South Dearborn St., masonry contract 3 story, 103 x 189 ft., rein.-con., brick, stone, to Olson & Berg, 7957 Rhodes Ave. Est. $200,000. Noted Sept. 4.

Kan., Dodge City—H. Hart, et al, 9 story, basement, 95 x 125 ft., rein.-con., brick, steel, stone hotel and shop building, 2nd Ave. and Spruce St., to Eastergardt & Bullard, Dodge City. Est. $300,000.

Mass., Brookline—Aspinwall Constr. Co., c/o Silverman & Brown, archts., 51 Cornhill, Boston, 3 story, basement, 120 x 240 ft., brick, steel, plain found., St. Paul St., to H. Tasker, 34 Waumbeck St., Roxbury. Est. exceeds $150,000.

N. J., Englewood Cliffs—Paterno Constr. Co., 122 East 42nd St., New York, three 15 story, basement, brick, steel, plain found., Hudson Terrace and Palisade Ave., separate contracts. $2,600,000. Private plans. **Maturity in 1931.** Noted Feb. 27.

N. J., Newark — Parrow Holding Co., 24 Branford Pl., 3 story, basement, 85 x 100 ft., brick, steel, 150-60 Goodwin Ave., separate contracts. $150,000. S. Cohen, 134 Branford Pl., archt.

N. Y., Brooklyn—Melbourne Lucas, 74 Rockville Center Parkway, Rockville Center, 6 story, Ocean Ave. and Avenue M, separate contracts. $150,000. Burke & Olsen, 32 Court St., archts.

N. Y., Brooklyn—J. and B. Development Corp., N. Jarasham, pres., 26 Court St., 2 story, East 31st St. and Avenue P, day labor and separate contracts. $162,000. I. Kallich, 26 Court St., archt.

N. Y., Brooklyn—One Thousand Five Hundred Twenty-Nine Dahill Rd. Corp., Dahill Rd. and Avenue O, 4 story, 87 x 140 ft., Dahill Rd., and Avenue O, separate contracts. $150,000. Seelig & Finkelstein, 153 Pierrepont St., archts.

N. Y., Brooklyn — J. C. Building Corp., 291 East 3rd St., apartment, separate contracts. $250,000. Seelig & Finkelstein, 153 Pierrepont Ave., archts.

N. Y., Brooklyn—L. Sorkin, 1744 East 10th St., 6 story apartments, Linden Blvd. and Flatbush Ave., separate contracts. $275,000. W. T. McCarthy, 147 Pierrpont St., archt.

N. Y., Jackson Heights—Resnikoff & Elg, c/o Queensboro Corp., 8120 37th Ave., apartment, incl. 2 buildings, on 200 x 223 ft. site, 83rd St. between Polk and Fillmore Aves., day labor and separate contracts. To exceed $600,000.

N. Y., New York—Billbuck Co., W. J. Buckley, pres., 2241 Creston Ave., 6 story, 75 x 105 ft., apartments, Kingsbridge Terrace and Kingsbridge Rd., separate contracts. $160,000. A. E. Schaefer, Jr., 2408 Grand Concourse, arch.

N. Y., New York—Creston Holding Corp., P. Gould, pres., 1910 Arthur Ave., 6 story, 175th St. and Weeks Ave., separate contracts. $150,000. G. W. Swiller, 4215 3rd Ave., archt.

N. Y., New York—Eastern Impvt. Corp., A. Ferman, pres., 1451 Boscobel St., 6 story, 50 x 84 ft., brick, steel, Popham Ave. and 176th St., separate contracts. $150,000. H. Ginsberg, 205 East 42nd St., archt.

N. Y., New York — Eight Hundred Eighty-Five West End Avenue Realty Corp., A. Distillator, pres., 1860 Bway., apartments, 202 East 16th St., to A. Distillator, 1860 Bway. Est. $1,500,000. Excavation under way.

N. Y., New York—East 93rd Street Corp., W. Greenough, pres., 72 Wall St., 4 story, 80 x 80 ft., 54 East 93rd St., to C. T. Wills, 286 5th Ave. Est. $300,000.

N. Y., New York—Golterm Eng. Co., D. Markbreiter, pres., 130 East 129th St., 6 story, 75 x 86 ft., separate contracts and day labor, $150,000. G. G. Miller, 545 5th Ave., archt.

N. Y., New York — New Era Constr. Co., R. D. Zappone, pres., 511 5th Ave., 9 story, 31 East 37th St., separate contracts and day labor. $150,000. H. E. Warren, 245 Park Ave., archt.

N. Y., New York—Seven West 96th Street Corp., D. A. Harrington, pres., 300 Madison Ave., 17 story, penthouse apartment 7 West 96th St., to Goodwin Constr. Co., 370 Madison Ave. Est. $750,000.

CLUBS

PROPOSED WORK

N. J., Orange—Y. M. C. A. (Colored Branch), 148 Central Pl., sketches by H. B. Marsh, 7 East 48th St., 2 story, basement, brick, Oakwood St. $150,000.

BIDS ASKED

La., New Orleans—Oct. 29, by Y.M.C.A., St. Charles St., 3 story, 84 x 137 ft., rein.-con., brick, steel, terra cotta, granite, stucco, concrete, wood pile found., incl. swimming pool, St. Charles St. $250,000. Favrot & Livaudais, Hibernia Bank Bldg., archts.

Mass., Brockton — National Club Building Comn., E. Perrault, chn. com., taking bids 3 story, basement, irregular sized, brick, stucco clubhouse, plain found. $150,000. C. T. Olson, 21 High St., archt.

N. J., Irvington (br. Newark)—A. M. Kleeman, archt., 987 Springfield Ave., taking revised general contract bids 2 story, basement, 60 x 100 ft., brick, steel, plain found., 40th St., for Irvington Amateur Athletic Club, 23 Myrtle Ave. Est. $150,000. Noted Aug. 22.

CONTRACTS AWARDED

Conn., New Haven—Quinnipeak Club, A. S. Brooks, chn. building comn., c/o Southern New England Telephone & Telegraph Co., 5 story, basement, 65 x 125 ft., brick, stone, steel clubhouse, plain found., to H. Wales-Lines Co., 134 State St., Meriden. Est. exceeds $150,000. Noted Sept. 18.

HOSPITALS

PROPOSED WORK

Mass., Boston — Boston Floating Hospital, 244 Washington St., revised plans by Stevens & Lee, 45 Newbury St., 4 story, basement, brick, steel, plain found., Ash St. $150,000 or more. Former bids rejected, will take new bids later from 2 lowest bidders on general and subcontracts. Noted Oct. 2.

Mass., Somerville—Somerville Hospital, F. J. Dreyer, chn. Building Comn., Crocker St., soon takes bids 4 story, basement, 40 x 160 ft., brick, rein.-con., steel, concrete found., Crocker and Towner Sts. $160,000. Stevens & Lee, 45 Newbury St., Boston, archts. A. Kellogg, 585 Boylston St., Boston, engr.

N. J., Newark—St. Barnabas Hospital, 685 High St., nurses home, power house, 685 High St. $1,500,000. Crow, Lewis & Wick, 200 5th Ave., archts. Project in abeyance. Noted Mar. 13.

N. Y., Dongan — Dpt. Hospitals, Municipal Bldg., New York, sketches by C. B. Meyers, 31 Union Sq., New York, 4 pavilions, Sea View Hospital. $300,000.

Tex., Kerrville—Owner, c/o Livesay & Wideman, archts., 607 San Jacinto Bldg., Beaumont, 15-story, steel hollow tile, stucco sanatorium, incl. hotel, airport, golf course, swimming pool, $1,950,000.

Ont., Hamilton—St. Peter's Infirmary, Maple Ave., plans by G. T. Evans, 72 James St., brick, steel, concrete infirmary addition, $200,000.

BIDS ASKED

Calif., Agnew—Nov. 4, by State Dpt. P. Wks., Sacramento, 2 story, rein.-con. ward, kitchen, steam plant building, 70,000 sq.ft. floor space, $300,000 available. G. B. McDougall, Pub. Wks. Bldg., Sacramento, state archt. Noted Oct. 2.

Ky., Louisville—Oct. 28, by D. X. Murphy & Bro., archts., Louisville Trust Bldg., 5 story, basement, 180 x 330 ft., brick, steel addition, 3rd and Oak Sts., for Norton Memorial Infirmary, 3rd and Oak Sts. $500,000. Noted Oct. 9.

Mass., Palmer—Oct. 28, by Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, brick nurses home, and brick, steel reception hospital. $200,000. M. W. Maloney, 23 Pearl St., Springfield, archt. for former and Kendall Taylor & Co., 209 Columbus Ave., Boston, archts. for latter buildings. Noted July 24.

Mich., Wyandotte—D. J. V. Snyder, archt., 939 Penobscot Bldg., Detroit, taking bids 4 story, brick, steel, rein.-con. hospital addition and 5th floor top addition to present hospital, plain found., Van Alstyne Blvd., for Wyandotte General Hospital. $200,000.

N. J., Newark—See "Contracts Awarded."

CONTRACTS AWARDED

Calif., Los Angeles—Los Angeles Co., metal work contract Acute Unit of County Hospital, to Metal Door & Trim Co., Laporte, Ind. (previously awarded to General Fireproofing Co., 1733 South Los Angeles St.); metal lathing, to Western Lathing Co., 185 Stevenson St., San Francisco. $408,068 covering units 2, 3, 4 and 5. Noted Oct. 9 under "Contracts Awarded."

Mich., Detroit—Grace Hospital, John R. St., 4 story, basement, 120 x 174 ft., brick, rein.-con., steel, stone, plain found., Alexandrine Ave., to Otto Misch Co., 159 East Columbia St. Est. $600,000.

N. Y., Kings Park—Dpt. Mental Hygiene, State Office Bldg., Albany, general contract reception, employees building, kitchen and dining rooms, at Kings Park State Hospital, to Freudlait Constr. Co., Inc., 912 Bway., Far Rockaway, $584,000; heating, to Afgo Eng. Co., 142 Fulton St., New York, $39,719; sanitary work, to T. J. Byrne Co., 355 West 26th St., New York, $65,900; electrical work, to Arc Electric Constr. Co., 330 East 39th St., New York, $28,884. Grand total $718,903. Noted Sept. 4.

N. Y., White Plains—Bloomingdale Hospital, 121 Westchester Ave., hospital, Westchester Ave., to F. N. Goble, Inc., 177 Brookfield St. Est. $1,250,000.

Pa., Pittsburgh—Eye and Ear Hospital, J. E. Crawford, chn. building com., Berger Bldg., excavation contract 10 story, brick steel, stone hospital, Darragh St., to R. M. Netherland Co., 359 Blvd. Allies. Total est. $1,000,000. Noted Apr. 25.

Que., Verdun—City, 100 bed Hospital, Lasalle Blvd., to U. Boileau, 4869 Garnier St., Montreal, $538,800.

CHURCHES

PROPOSED WORK

N. J., Glen Ridge—Glen Ridge Congregational Church, Ridgewod Ave., sketches by Gnilbert & Betelle, 20 Branford Pl., Newark, brick church and Sunday school. $150,000.

N. J., Dunnellen—First Methodist Church sketches by Poggi & Bragdon, 275 Morris Ave., Elizabeth, brick, parish house, $150,000.

N. J., Jersey City—First United Presbyterian Church, W. B. Gold, pastor, 30 Tonnele Ave., 12 story, basement, brick, steel church, apartment, Sip and Tonnele Aves. $900,000.

N. J., Newark—Franklin Memorial Church, 107 Franklin Ave., 2 story, basement church, Maple St. and Keer Ave. $150,000. **Maturity probably about February.** Noted Jan. 2.

N. J., Woodcliff — Lutheran Church of Our Saviour, H. Koeffler, chn. Building Com., Hamilton Ave. and 1st Pl., sketches by A. F. Bernhard, 319 East 197th St., New York, 2 story, basement, brick, steel, plain found., Hudson Blvd. and Hegeman Pl. $150,000. Noted Oct. 16.

N. Y., Port Richmond—Italian Protestant Mission Church, c/o Grace Methodist Episcopal Church, brick, steel, Forest Ave. near Richmond Ave. $150,000.

BIDS ASKED

N. J., Jersey City — A. Peter, archt., 207 Market St., Newark, bids about Mar. 1, general contract 2 story, basement church, rectory and garage addition, St. Paul and Tonnele Aves., for St. Ann's Polish Catholic Church, J. Wrzeciano, 291 St. Pauls Ave. $150,000. Noted Oct. 16.

N. J., Ocean City—E. G. Perrot, archt., 1811 Arch St., Phila., Pa., bids about Nov. 1, general contract 1 story, basement, brick, steel, stone, Asbury Ave., for St. Augustines Roman Catholic Church, T. F. Blake, 1335 Asbury Ave. Est. $150,000. Noted Apr. 3.

N. J., South River—A. Merchant, archt., 1 Elm Row, New Brunswick, bids about Nov. 15, general contract 1 and 2 story, tower, brick, steel, Main and Gordon Sts., for Methodist Church. $150,000. Noted Oct. 9.

R. I., North Providence (mail Providence)—See "Contracts Awarded."

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Churches (Continued)

Wash., Seattle—J. Graham, archt., Dexter Horton Bldg., bids about Dec. 13, general contract 4 story, basement, 250 x 350 ft. school (1st unit) group buildings to include chapel, convent, gymnasium, seminary building, for Sulpician Seminary of St. Edwards. $500,000.

CONTRACTS AWARDED

Conn., Middletown — Methodist Episcopal Church, J. Dodd, chn., 1 story, basement, brick, stone, to B. C. Stone, Main St., Portland, $108.-987. Noted Oct. 2.

R. I., North Providence (mail Providence)—Mission of St. Ann's, A. Bove, pastor, 7 Touro St., Providence, 1 story, basement, brick, stone church, plain found., day labor. $150,000. A. J. Murphy, Fenner St., Providence, archt.

SCHOOLS

PROPOSED WORK

Ark., Conway — Hendrix Henderson College, J. H. Reynolds, pres., revised plans by Wittenburg & Delony, 408 Home Insurance Bldg., Little Rock, and soon takes bids 3 story, basement, 60 x 130 ft., rein.-con., brick science building. $150,000. Noted June 27.

Calif., Berkeley—Berkeley School Dist. will vote on proposal to raise $250,000 each year via direct taxation, in four year period would provide sufficient funds to finance 12 elementary units and completing high school plant.

Calif., Claremont—Claremont College sketches by Allison & Allison, 605 California Reserve Bldg., Los Angeles, 3 story, rein.-con. physics building on campus. $205,000.

Calif., Pomona—Pomona College sketches by Allison & Allison, California Reserve Building, Los Angeles, physics building, incl. auditorium, laboratories, work rooms. $200,000.

Calif., San Francisco—City and San Francisco Co. plans by Crim, Resing & McGuiness, 488 Pine St., Junior High School, 3 story, basement, rein.-con., 25th and Noe Sts. $650,000.

Calif., San Francisco—St. Ignatius College, Turk and Fulton Sts., sketches by E. A. Eames, 353 Sacramento St., fireproof college buildings, incl. science building $300,000, law $250,000, library $200,000, gymnasium $230,-000, auditorium $150,000, open air students union building $100,000, stadium, also purchasing athletic equipment $690,000. Turk and Fulton Sts. Total est. $6,000,000.

Conn., New Britain—City school, Oak St., $150,000. Architect not selected.

Conn., New Canaan—Town, Bd. Educ., Junior High School, $275,000 voted for same. Architect not selected.

Conn., Storrs—Connecticut Agricultural College, C. C. McCracken, pres., brick, steel, economics building. $250,000. Architect not selected.

Ind., Angola—Tri-State College plans by Larimore & Parkinson, 702 Tri-State Bldg., Ft. Wayne, brick, steel auditorium, on campus. $150,000.

Ind., Bloomington—Indiana University plans by Granger & Bollenbacher, 333 North Michigan Ave., Chicago, Ill., Men's Union Memorial Building, rein.-con., limestone, on campus. $1,000,000.

Ind., Richmond—School Comrs. bids in November 4 rein.-con., brick, stone grade school buildings and additions. $175,000. Hamilton, Fellows & Medved, 814 Tower Court, Chicago, Ill., archts.

Mass., Cambridge—Massachusetts Institute of Technology, S. Stratton, pres., 222 Charles River Rd., plans by Coolidge & Carlson, 89 State St., Boston, 5 story, basement, brick, limestone, steel chemistry building unit, plain found., Charles River Rd. To exceed $150,000

Mass., East Boston (sta. Boston) — City of Boston, Dpt. School Buildings, soon takes bids 2 story, basement, brick, limestone, granite, plain found., Paris St., U. S. Grant Dist. $150,000. L. J. St. Armand, 101 Tremont St., Boston, archt. Noted June 12.

N. J., Elizabeth—Bd. Educ., 3 story, basement, brick, steel high school addition, plain found., 20 Morrell St. Project in abeyance. H. B. Brady, Inc., 333 North Broad St., archt. Noted Aug. 8.

N. J., Hasbrouck Heights — Bd. Educ., Administration Bldg., Junior and Senior High School, Terrace Ave. Tooker & Marsh, 101 Park Ave., New York, archts. Project in abeyance. Noted May 22.

N. J., Paulsboro — Bd. Educ. plans by Edwards & Green, Bway. and Steven Sts., high school addition. $180,000.

N. J., Roselle Park—Bd. Educ., W. F. Bigelow, pres., revised sketches by H. B. Brady, Inc., 333 North Broad St., Elizabeth, 2 story, basement, brick, steel, rein.-con. high school. $360.-000. Noted Feb. 13.

N. J., South Orange—Carteret Academy, H. V. Osborne, pres. Bd. Trustees, 317 Carteret Pl., Orange, 2 story, basement, brick, steel, White Oak Ave. $200,000. Project in abeyance, may mature 1931. Noted July 17.

N. Y., Durham—Bd. Educ. plans by H. O. Fullerton, National City Bldg., Cleveland, O., 2 story, basement, brick, steel, concrete central school. $150,000.

N. Y., New York—Bd. Educ., 500 Park Ave., plans by W. C. Martin, archt. and supt. School Bldgs., Flatbush Ave. extension and Concord St., Brooklyn, altering P. S. 72, 3 story, 84 x 193 ft., brick, Dewey and Edison Aves. $320,-000.

N. Y., St. George — Bd. Educ., 500 Park Ave., New York, revised plans by W. C. Martin, Flatbush Ave. extension and Concord St., Brooklyn, 2 story, basement, brick, steel vocational school, St. Marks Pl. $150,000.

O., Cleveland—Bd. Educ., F. G. Hogen, dir., plans by G. M. Hopkinson, Auditorium Garage Bldg., Charles Eliot Junior High School, est. $800,000; also Grovewood Junior High School, Grovewood Ave., $800,000, both 3 story, basement, brick, steel, concrete.

O., Cincinnati—University of Cincinnati, Clifton Ave. plans by Garber & Woodward, 616 Walnut St., 3 story, basement, brick, rein.-con. botany and zoology building, plain found., $400,-000; plans by Crowe & Schulte, 2436 Reading Rd., 3 story, basement, brick, rein.-con. physics building, plain found., $400,000, both on University Campus.

O., Salem—City, Bd. Educ. plans by C. G. Owsley Co., 669 Wick Ave., Youngstown, 2 story, basement high school, incl. gymnasium, auditorium, cafeteria, swimming pool. $385,000.

O., Strongsville (br. Cleveland)—Bd. Educ., H. V. Pope, clk., plans by Fulton & Taylor, 8120 Euclid Ave., Cleveland, 2 story, brick, steel addition, Wooster Pike. Election Nov. 4, $150,000, for same.

Pa., Brentwood—Bd. Educ., Brentwood Boro, C. H. Bracken, secy., 3108 Brownsville Rd., sketches by E. B. Lee & H. W. Viehman, Chamber of Commerce Bldg., Pittsburgh, brick, steel high school, probably on Brownsville and Point View Rds. Election Nov. 4, $250,000 bonds, for same.

Pa., Pittsburgh—Bd. Educ., H. W. Chamblet, secy., Administration Bldg., plans by P. C. Dowler, Century Bldg., and bids this fall (1st unit) Knoxville Junior High School Addition, brick, steel, Grimes Ave. $350,000. Total est. $1,100,000.

Pa., Pittsburgh—Bd. Educ., H. W. Cramblet, secy., Administration Bldg., plans by J. T. Steen & Sons, Vandergrift Bldg., Prospect Elementary and Junior High School, 3 and 4 story, basement, 240 x 230 ft., brick, steel, Southern and Prospect Sts. $600,000. C. L. Woolridge, Inc., Fulton Bldg., consult. engrs.

Pa., Waynesburg—Waynesburg College, P. R. Stewart, pres., sketches by Thayer Co., Greer Bldg., New Castle, 3 story, 180 x 190 ft., brick, stone gymnasium. $200,000.

Tex., Odessa—Bd. Educ., c/o Secretary, plans by Peters, Strange & Bradshaw, Big Springs and Lubbock, 3 story, brick, rein.-con., stone, steel high school, incl. auditorium, 750 seating capacity, gymnasium, laboratories. $170,000.

Tex., San Antonio — Society of Mary, c/o J. Waldron, brother, 112 Pine St., San Antonio, or 5025 Cote Brilliante Ave., St. Louis, Mo., bids in November, 3 story, basement, 58 x 400 ft., rein.-con., brick, stone high school, faculty quarters and auditorium building. H. Dreisoerner, 3828A Arsenal St., St. Louis, Mo., archt. Noted Aug. 14.

BIDS ASKED

Calif., Los Angeles—Pasadena City School Dist. taking bids 120 x 180 ft., rein.-con., auditorium, 1,200 seating capacity, John Muir High School.

Conn., Middletown—Oct. 31, by City, J. E. Boylen, chn. com., 111 Main St., and Towner & Sellew, archts., 363 Main St., 2 story, basement, brick high school addition, plain found. $150,000. Noted Aug. 15.

Conn., Middletown—Oct. 24, by City, F. L. Doris, secy., Town Council, and Towner & Sellew, archts., 363 Main St., Senior and Junior High School, 2 story, basement, brick, plain found. $225,000. Noted June 5.

Del., Newark—Nov. 7, by Delaware School Found., A. J. Taylor, vice-pres., Du Pont Bldg., Wilmington, 2 story, basement, brick, steel addition, plain found. $150,000. Guilbert & Betelle, 20 Branford Pl., Newark, N. J., archts. Noted Oct. 9.

Ind., Gary — Oct. 28, by Bd. Educ., Lew Wallace High School, 3 story, basement, rein.-con., brick, steel, 47th, Van Buren and Jackson Sts. $1,000,000. W. B. Ittner, Inc., Continental Life Bldg., St. Louis, Mo., archts.

Ind., Hammond—School Comrs. taking bids George Rogers Clark School, 2 story, basement, 215 x 325 ft., rein.-con., brick, hollow tile, incl. gymnasium, auditorium. $500,000. L. C. Hess, Hammond, archt.

Ind., Oakland City—Bd. School Comrs. bids about Nov. 1, 2 story, basement, 120 x 129 ft., brick, steel high school, incl. gymnasium, auditorium. $150,000. H. E. Boyle & Co., Furniture Bldg., Evansville, archts. Noted Oct. 9.

La., Bayville—Nov. 4, by Richland Parish School Bd., 3 story, rein.-con., brick, stone high school, wood pile found. $175,000. E. F. Neild, City Bank Bldg., Shreveport, archt. Noted Sept. 11.

Mass., Fairhaven—Town, W. B. Gardner, chn. School Comn., taking bids altering and constructing 2 story, basement, brick, steel addition to Senior High School, plain found., near Rogers Sq., $200,000; heating, plumbing, electrical work, est. $25,000 or more. W. Tallman, 222 Union St., New Bedford, archt. Noted Oct. 9.

Mass., North Randolph—Oct. 28, by Town of Randolph, W. D. Condon, chn., 2 story, basement, 60 x 120 ft., brick, steel, O St. $125,000-$150,000. J. E. Kelley, 38 Chauncy St., Boston, archt. Noted Sept. 25.

Minn., Minneapolis—Nov. 6, by Bd. Educ., 305 City Hall, 3 story, basement, brick, stone, rein.-con., 36th St. between 20th and 21st Aves. $250,000. Architectural Dpt. of Owner, archts.

N. J., Bayhead — Nov. 1, by Bd. Educ., 1 story, basement, brick, steel, school, gymnasium, plain found. $155,000. K. W. Dalzell, 263 Central Ave., East Orange, archt. Noted Sept. 18.

N. J., Hillside (sta. Elizabeth)—Bd. Educ., H. Doremus, pres., Township Hall, bids about Dec. 1, 2 story, basement, brick, steel, school, Conant and Winchester Aves. $175,000. J. Wind, Jr., 1450 North Broad St., engr. Noted Oct. 16.

N. J., Hillside (sta. Elizabeth)—Oct. 28, by Bd. Educ., H. W. Doremus, pres., Central Grammar School, 2 story, basement, brick, steel, rein.-con., Leslie St. and Winans Ave. $165,000. J. Wind, Jr., 1450 North Broad St., archt. Noted Oct. 2.

N. J., Jersey City—Bd. Educ., Administration Bldg., Harrison Ave., bids about Mar. 1, 3 story, basement, rein.-con., brick, steel addition to Dickinson High School, Palisade Ave. $450,000. J. T. Rowland, Jr., 30 Journal Sq., archt. Noted Mar. 13.

N. J., Lakewood — Bd. Educ., bids about Mar. 1, 2 story, basement, brick, steel, rein.-con., plain found. $150,000. C. B. Cook, Asbury Park Trust Bldg., Asbury Park, archt. Noted Oct. 2.

N. J., Linden—Bd. Educ., St. George Ave., bids about Nov. 15, general contract 2 story, basement, brick, steel, rein.-con. addition to Senior High School, St. George Ave. $380,000. H. B. Brady, Inc., 333 North Broad St., Elizabeth, archt. Noted Aug. 21.

N. J., North Plainfield (mail Plainfield)—Bd. Educ. bids about Dec. 1, 2 story, basement, brick, steel, rein.-con. school. $150,000. J. N. Pierson & Son, 198 Jefferson St., Perth Amboy, archt. Noted Oct. 16.

N. Y., Flushing—Oct. 30, by W. C. Martin, archt. and supt. School Buildings, Flatbush Ave. extension and Concord St., Brooklyn, general contract P. S. 24, Holly Ave. from Union to Robinson Sts., for Bd. Educ., 500 Park Ave., New York. Noted Oct. 16.

N. Y., Sunnyside—Oct. 30, by W. C. Martin, archt. and supt. School Buildings, Flatbush Avenue extension and Concord St., Brooklyn, general contract P. S. 150, 43rd Ave. from 40th and 41st Sts., for Bd. Educ., 500 Park Ave., New York. Noted May 15.

N. C., High Point—Bd. School Comrs., T. W. Andrews, supt., bids about Dec. 1, Junior High School, 3 story, fireproof. $300,000. H. Barton, Greensboro, archt. Noted Oct. 9.

R. I., Cranston (mail Providence)—Oct. 24, by City, H. Fenner, supt. High School, 2 story, basement, brick, stone grade school and assembly hall, plain found., Shaw Ave. $150,000. W. R. Walker & Son, 49 Weybosset St., Providence, archts. Noted Sept. 25.

S. C., Columbia—University of South Carolina, D. M. Douglas, pres., bids about November, 2½ story, brick, stucco, stone classroom and laboratory building. $250,000. Equipment cost $50,000. J. C. Johnson, Columbia, archt. Noted Aug. 7.

Tenn., Clarksville—Nov. 6, by State of Tennessee Dpt. Educ., War Memorial Bldg., Nashville, 3 story, basement dormitory. $200,000. E. H. Woolwine, 215 Lee Bldg., Nashville, archt. Noted Aug. 7.

Tenn., Cookeville—Nov. 6, by State of Tennessee, Dpt. Educ., War Memorial Bldg., Nashville, Industrial Arts and Home Economics Buildings, 3 story, basement, $175,000 each. R. H. Hunt & Co., James Bldg., Chattanooga, archt. Noted Oct. 9.

Tex., Denton—Dec. 9, by College of Industrial Arts, c/o T. N. Fitzgerald, chn., 3 story, 113 x 145 ft. with 59 x 69 ft. court, brick, stone, rein.-con. dormitory. $150,000. C. Knight, 330 Wilson Bldg., Dallas, archt. Noted Sept. 25.

Tenn., Murfreesboro—Nov. 6, by State of Tennessee Dpt. Educ., Nashville, 3 story, basement science building. $225,000. Marr & Holman, Stahlman Bldg., Nashville, archts. Noted Aug. 7.

CONTRACTS AWARDED

Calif., Berkeley—Bd. Regents University of California, Oct. 6, general contract College of Engineering, incl. groups concrete, brick, steel buildings, to Barrett & Hilp, 918 Harrison St., San Francisco, $499,275; mechanical work, to Turner Co., 329 Tehama St., San Francisco, $61,152. Noted Sept. 25.

Calif., Santa Clara — University of Santa Clara, 2 story, rein.-con., brick library, to H. C. Miller, Santa Clara, $150,000.

Conn., West Hartford (br. Hartford)—Town, School Bd., 2 story, basement, 190 x 290 ft. school, to A. F. Peaslee, Inc., 15 Lewis St., Hartford, $360,050; plumbing and heating, to Thomas P. Shaffer, Inc., 49 Pearl St., Hartford, $70,510. Noted Sept. 25.

Ill., Chicago—Bd. Educ., 188 West Randolph St., E. Mitchell, mgr., general contract Charles P. Steinmetz Sennior High School, red face brick, stone, modified Tudor Gothic design, incl. 2 small gymnasiums for girls, 1 large gymnasium for boys, swimming pool, lunch room, library, laboratories, to Thorgersen & Ericksen

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Schools (Continued)

Co., 228 North La Salle St., $515,901; fireproofing, to United States Fireproofing Co., 228 North La Salle St., $117,520; sheet metal, to L. Vallas, 2848 West Lake St., $34,430; miscellaneous metal, to Western Arch Iron Co., 3455 Elston Ave., $38,177; steel erection, to Calumet Constr. Co., 1272 West North Ave., $59,275; carpentry, to Coath & Goss, 549 West Randolph St., $204,709. Grand total $970,012. Noted Sept. 11.

Ind., East Chicago—Bd. School Comrs., general contract rein.-con., brick, stone school, incl. gymnasium, auditorium, to C. Hansen, 604 State Line St., Calumet City, Ill. Est. $150,000. Noted Sept. 25.

Ind., Richmond—School Comrs., general contract 85 x 140 ft, brick, steel, stone school, incl. gymnasium, stage, to E. A. Anderson, Centerville. Est. $150,000. Noted Sept. 25.

Kan., Kansas City—Leavenworth Diocese of Roman Catholic Church, c/o E. F. Vallely, chn. building comn., 2300 North 8th St., Boys High School, 3 story, basement, 136 x 176 ft., rein.-con., brick, to M. J. Green, Manhattan. Est. $200,000. Noted Sept. 4.

La., New Orleans—Orleans School Bd., Girls High School, 3 story, rein.-con., brick, stucco, to J. A. Petty, Audubon Bldg., $525,985. Noted Sept. 4.

Mass., Holyoke—City, Bd. Educ., 2-3 story, 150 x 224 ft. school, to La France Constr. Co., 292 Maple St., $279,333. Noted Oct. 2.

Mass., Yarmouth — Town, School Building Com., 2 story, basement, irregular sized, brick, stone grade and high school, plain found., South Yarmouth Sect., to A. M. Lundberg, Railway Exch. Bldg., St. Louis, Mo., and South Dennis, Mass. Est. $200,000. Noted Oct. 2.

Mo., Ferguson—Bd. Educ., (1st unit) 2 story, basement, 74 x 112 ft., rein.-con., brick high school, to E. F. Stoeckel, 4647 Moraine Ave., St. Louis; plumbing, to E. C. C. Reisel Plumbing Co., 4418 North Bway., St. Louis; heating, to Guaranteed Heating & Eng. Co., 1620 Chestnut St., St. Louis; electrical wiring, to Vierheller Electric Co., 1111 Pine St., St. Louis. Noted Sept. 11.

Mo., Kansas City—Bd. Educ., (1st unit) 2 story, basement, brick, rein.-con. school, 53rd St. and Jackson Ave., to Interstate Constr. Co., 205 Walsix Bldg., $158,225.

N. J., Englewood—L. C. Licht, archt., 19 Knickerbocker Rd., general contract 2 story, basement, 80 x 120 ft., brick, steel, to F. and C. Haerter, 769 Dewey Ave., West New York, for Dwight School, 315 East Palisade Ave. Est. $150,000. Noted Oct. 2.

N. J., Leonardo—Bd. Educ., Middletown Twp., W. Petingale, secy., general contract Leonardo Grade School, 2 story, basement, brick, steel, to A. Christensen, 80 Broad St., Elizabeth. $128,200. Noted Sept. 18.

N. J., Leonardo—Bd. Educ. Middletown Twp., W. M. Petingale, secy., general contract Leonardo High School addition, to J. Salaki, Fords, est. $150,000, plumbing and heating, to W. R. Hogg Co., Railroad Ave., Asbury Park, electrical work, to H. Mielke, 521 Bway., Long Branch; plumbing for Leonardo Grade School, to J. D. Crean, 3rd Ave., Long Branch, heating and ventilating, to W. R. Hogg, Railroad Ave., Asbury Park, electrical work, to A. Neri, Inc., 928 Washington St., Hoboken. Noted Sept. 18.

N. Y., New York — Sacred Heart Convent, 130th St. and Convent Ave., gymnasium, to Lippe Constr. Co., 17 West 60th St. Est. exceeds $150,000.

N. Y., Plattsburgh—Dpt. Educ., State Educ. Bldg., Albany, general contract State Normal School, to T. C. Brown Co., 307 Union St., Schenectady, $688,284; heating, to Hudson Falls Hardware Co., 186 Main St., Hudson Falls, $103,758; sanitary work, to Homeline Co., Utica, $35,902; electrical work, to Langdon & Hughes, 248 Elizabeth St., Utica, $32,400. Grand total $860,344. Noted Sept. 29 Daily.

O., Carthagena—Congregation of the Precious Blood, I. Wagner, pastor, 3 story, basement, brick, steel, concrete seminary, to Robert H. Evans Co., Mellett Bldg., Canton. Est. $350,000. Noted Sept. 18.

Pa., Mt. Lebanon—Bd. Educ., general contract 3 story, basement, 63 x 278 ft., brick, steel high school, to Pittsburgh Eng. & Constr. Co., 511 North Homewood Ave., Pittsburgh; $280,000, plumbing, to Moss & Blakely, 223 Beltzhoover Ave., Pittsburgh, $27,811; wiring, to Delmer Electric Co., 1722 West Liberty Ave., Pittsburgh, $38,874. Grand total $346,685. Bids on heating rejected, new bids soon. Noted June 5.

Pa., Phila.—Bd. Educ., E. Merchant, secy., 19th and Ludlow Sts, 4 story, basement, 65 x 203 ft., rein.-con., brick, plain found., to P. Bros, 2511 West Huntingdon St., $242,995; heating, to McClintock Co., 5608 Race St., $36,959. Noted Oct. 2.

Pa., Washington—Bd. Educ., R. C. Buchanan, pres., Jefferson and Wylie Aves., general contract Junior and Senior High School, 3 and 4 story, basement, 62 x 350 ft., brick, hollow tile main building, 2 story, basement, 72 x 125 ft. shop, 2 story, basement, 86 x 104 ft. auditorium, 2 story, basement, 86 x 104 ft. gymnasium, incl. swimming pool, rein.-con. bleachers, heating plant under bleachers, to Baker & Coombs, 319 DeMain Ave., Morgantown, W. Va.; plumbing and heating, to McVehil Plumbing Co., 40 East Wheeling St.; electric wiring, to Home Electric Co., Fairmont Pike, Morgantown, W. Va. Est. $650,000. Noted Sept. 11.

THEATRES

PROPOSED WORK

N. J., Elizabeth—S. H. Schlicter, 556 North Broad St., revised plans by Poggi & Bragdon, 275 Morris Ave., 2 story, basement, brick, steel theatre, office, 556 Broad St. $450,000. Noted Feb. 27 under "Contracts Awarded."

CONTRACTS AWARDED

Calif., San Francisco — Miller & Pflueger, archts., 580 Market St., general contract rein.-con. theatre, to H. L. Peterson, 731 Treat Ave., $250,000; structural steel, to Golden Gate Iron Wks., 1541 Howard St. Noted Sept. 11.

Calif., Westwood—Fox West Coast Theatres, Inc., Washington and Vermont Sts., Class A rein.-con. theatre, to Beller Constr. Co., 6513 Hollywood Blvd., Los Angeles, $200,000.

Kan., Hutchinson — Rorabaugh-Wiley Co., owner, Rorabaugh-Wiley Bldg., and Fox West Coast Theatres, lessee, c/o M. B. Shanberg, 610 Midland Bldg., Kansas City, Mo., general contract 2 story, basement, 71 x 165 ft., brick, stone, terra cotta, rein.-con. theatre, 1,550 seating capacity, and store, to E. C. Clickner Constr. Co., 22 West 2nd St. Noted Oct. 28.

Mass., Lawrence—Salem Realty Co., 126 Washington St., general contract 2 story, basement, irregular sized, brick, stone, granite, steel theatre, store, office, to C. S. Cunningham & Sons, 80 Boylston St., Boston. Total est. $1,000,000. Noted Sept. 25.

Neb., Ord.—H. Biemond, general contract rebuilding 3 story, basement, 44 x 125 ft., brick, steel, stone, concrete theatre, to H. Ohlsen & Son's Co., David City.

BANKS

PROPOSED WORK

Mass., Framingham—Framingham Co-operative Bank, H. Davenport, 5 Irving St., remodeling 3 story, basement bank, $150,000 or more. Architect not selected.

N. J., Stone Harbor — First National Bank, H. I. Taylor, pres., 1 story, basement, brick, steel bank, $200,000. **Maturity indefinite.** I. H. Glaser, 620 Madison Ave., New York, archt. Noted July 31.

Pa., Pittsburgh—P. C. Dowler, archt., Century Bldg., soon lets contract 1 story, basement, 44 x 111 ft., steel, stone, concrete, marble, terrazzo, Forbes and Murray Aves., for Peoples-Pittsburgh Trust Co., J. H. Hillman, chn. bd., 4th and Wood Sts. $150,000.

Wash., Spokane—Spokane & Eastern Trust Co., J. L. Campbell, secy., plans by A. Moorman & Co., 813 1st Natl. Soo Line Bldg., Minneapolis, Minn., 8 story, basement, 600 x 100 ft., rein.-con., terra cotta, granite, bank, office, Howard and Riverside Sts. $500,000.

BIDS ASKED

N. J., Montclair — Holmes & Von Schmid, archts., 42 Church St., bids about Nov. 15, general contract 1 story, basement, brick, steel, Grove St., for Town Trust Co., 79 Walnut St. $150,000. Noted Oct. 9.

N. J., Orange—Holmes & Winslow, archts., 153 East 38th St., New York, bids about Nov. 1, general contract 1 story, basement, brick, steel, plain found., for Orange Savings Bank, 288 Main St. Est. $150,000. Noted Oct. 2.

N. J., Orange—Myers & Shanley, archts., 24 Walnut St., Newark, bids about Nov. 15, general contract altering and constructing 2 story, basement, brick, steel addition, South Orange Ave., for South Orange Trust Co., 53 South Orange Ave. $150,000. Noted Oct. 2.

CONTRACTS AWARDED

Pa., Phila.—Owner, c/o R. J. Seltzer, 15th and Locust Sts., 3 story basement, 24 x 100 ft., rein.-con., brick, steel, stone bank, office, 1503 Walnut St., to G. Kessler Co., 1733 North Marvine St.

OFFICES

PROPOSED WORK

Calif., Los Angeles—T. Pittman, Washington St. and Rimpau Blvd., plans by S. C. Lee, 532 Petroleum Securities Bldg., 2 story, basement, 140 x 160 ft., concrete, brick, tile office, store, Washington St. and Rimpau Blvd. $150,000.

Calif., Los Angeles—Trabus Pittman, c/o S. C. Lee, 2404 West 7th St., 2 story, basement, 145 x 160 ft., brick, incl. stores, Washington St. and Rimpau Blvd. $150,000.

Mass., Lowell—Courier-Citizen Co., N. Spence, treas., plans by H. P. Graves, 40 Middlesex St., altering and constructing 4 story, basement, brick, steel office, stores addition, Merrimack St., $150,000.

N. J., Hackensack—H. O. Hamilton, archt., 369 Lexington Ave., New York, bids in December, general contract 2 story, basement, brick, steel incl. store, plain found., Main St., for L. M. Wells, c/o architect. $150,000. Noted Apr. 24.

N. J., East Orange—C. Mumma, 147 Halsted St., sketches 2 story, basement, 100 x 100 ft., brick, steel, incl. stores, Central Ave. and Amherst St. $150,000. F. J. Murray, mayor, City Hall, lessee. Noted Oct. 2.

N. Y., New York—Union Carbon & Carbide Co., 30 East 42nd St., office, Madison Ave. and 41st St. To exceed $1,000,000. **Maturity late in spring.** Noted Mar. 13.

Ont., Toronto — Syndicate, c/o Chapman & Oxley, archts., Sterling Tower, sketches British Empire Trade Building, concrete, stone, concrete and pile found., Fleet St. $1,000,000.

BIDS ASKED

Mass., Boston—Tomfohrde Building, A. P. Pearce, Jr., trustee, 15 State St., taking bids reconstructing 4 story, basement, brick, office, incl. stores, 37-51 Court St. $150,000. Blackall, Clapp & Whittemore, 31 West St., archts. Noted Oct. 16.

CONTRACTS AWARDED

Calif., San Francisco — Mills Estate, Inc., Mills Bldg., 22 story, basement, Class A rein.-con. office, Bush St., to Lindgren-Swinerton, Inc., 225 Bush St., $1,750,000.

N. Y., Flushing—Blanchard Realty Co., 425 Riverside Dr., New York, general contract office, to I. Langner & Son, 60 East 42nd St., New York. Est. $200,000. Noted Sept. 18.

S. C., Charleston—S. H. Kress & Co., 247 King St., 3 story, fireproof office, 281-283 King St., to G. A. Miller Constr. Co., Tampa, Fla. Est. $175,000-$200,000.

Tex., Dallas—Crowdus Realty Co., 26 story, 3 basements, 99 x 100 ft., brick, stone, rein.-con. office, Commerce and Lane Sts., to Whitson & Roberts, 1711 Santa Fe Bldg. Contractors taking bids sub-contracts.

STORES

PROPOSED WORK

Ark., Little Rock—Pfeifer Bros. Dpt. Store, P. Pfeifer, pres., 514-24 Main St., sketches 4 story, basement, rein.-con., brick department store, 7th and Main Sts. $500,000.

Calif., Bakersfield — S. H. Kress Co., 621 South Bway., Los Angeles, plans by Engineering Dpt. of owners, 3 story, basement, brick department store, 10th and K Sts. $150,000 or more.

Calif., Oakland—P. Bowles, Russ Bldg., San Francisco, sketches by D. Stone, 1706 Bway., 2 story, basement, rein.-con., 1717 Bway. $150,000.

Mass., Attleboro—A. T. Nelson, 1 Federal St., Boston, 4 or more story store, office, 199-201 Main St. To exceed $150,000. Architect not selected.

Mich., Detroit—Pringle Furniture Co., West Grand Blvd., plans by Weston & Ellington, 1507 Stroh Bldg., 2 story, 80 x 150 ft., brick, rein.-con. addition. $150,000.

N. Y., New York — Thirty-Four-Thirty-Fifth Street Corp., L. I. Meade, pres., 10 West 33rd St., plans by R. T. Lyons, 40 East 49th St., 11 story store, apartments. $500,000.

BIDS ASKED

N. J., Perth Amboy—Oct. 27, by J. Eberson, archt., 370 Lexington Ave., New York, 2 story, basement, 105 x 260 ft. stores and commercial section building, Smith and Maple Sts., for Warner Bros. Pictures, Inc., H. M. Warner, pres., 321 West 44th St., New York. Est. $1,000,000. Ruderman & Severend, 370 Lexington Ave., New York, engrs. Noted Sept. 29 Daily.

Tex., Brownsville—W. T. Grant Co., 20 North Wacker Dr., Chicago, Ill., and 1441 Bway., New York, taking bids general contract department store, 1105 Elizabeth St. $360,000.

CONTRACTS AWARDED

Calif., San Francisco—S. H. Kress Co., 621 South Bway., Los Angeles, 3 story, basement, rein.-con. department store, Mission St., to K. E. Parker, 135 South Park St., $150,000.

Ga., Atlanta — L. P. Lewis Estate, c/o E. Lewis, 707 Grant Bldg., 5 story, basement, 100 x 120 ft., brick, rein.-con. store, Peachtree St., day labor and sub-contracts. W. F. Chase, supt. constr.

PUBLIC

PROPOSED WORK

Calif., Beverly Hills — CITY HALL and LIBRARY—City plans by Koerner & Gage, 468 North Camden Dr., and J. C. Austin & F. M. Ashley, Chamber of Commerce Bldg., Los Angeles, rein.-con. $1,000,000. Noted May 15.

Calif., Los Angeles—COURT HOUSE—Los Angeles Co. sketches by K. Muck, c/o Los Angeles County Architectural Dpt., 22 story, 250 x 460 ft., Gothic style architecture, Bway. and Hill Sts. between 1st and Temple Sts. To exceed $5,000,000.

Ind., Anderson—OFFICE AND MEMORIAL CHAPEL—Anderson Memorial Park, rein.-con. brick office and chapel. $150,000. M. B. Vorce, 242 Lafayette St., Detroit, Mich., engr.

Mass., Fall River — FIRE STATION — City plans by E. M. Corbett, 49 Purchase St., and soon takes bids 2 story, basement, 75 x 135 ft., brick, stone, concrete found., Bedford and Troy Sts. $150,000. E. F. Harrington, city engr. Noted Aug. 28.

Mass., Marblehead—FIRE STATION—Town, Bd. Selectmen, central fire station, Green and Brown Sts., and 2 small stations at Marblehead Neck and Clifton Sections. To exceed $150,000. Architect not selected.

Mass., Newton—POLICE STATION—City, S. Weeks, mayor, sketches by J. H. Ritchie & Associates, 250 Stuart St., Boston, 2 story, basement police station. $150,000 or more.

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Public (Continued)

N. J., Asbury Park—PAVILION—Bd. City Comrs., City Hall, 2 story, basement, brick, steel, plain found., $250,000. Project in abeyance. **Maturity indefinite.** Noted Jan. 30.

N. J., Hillside (sta. Elizabeth)—MUNICIPAL—Twp. Comn., Township Hall, 2 story, basement, brick, steel municipal building, $150,000. **Maturity in 1931.** Noted June 12.

N. J., Morristown—JAIL and POST OFFICE—Bd. Freeholders Morris Co., Court House, sketches by Palmer & Plousky, 55 William St., New York, 2 story, basement jail, 4 story, basement, office building, Court St. $150,000.

O., Cleveland—INSTITUTIONAL BUILDINGS—Bd. Comrs. Cuyahoga Co., Court House, election Nov. 4, $1,850,000, brick, steel, concrete institutional buildings for county detention home and juvenile court building, East 21st and Payne Sts. Architect not selected.

BIDS ASKED

Calif., Pasadena—AUDITORIUM—Nov. 24, by Bd. City Directors, 156 x 210 ft. auditorium, and 115 x 190 ft. exhibition hall rein.-con., steel, $1,000,000. Bennett & Haskell, 311 1st Trust Bldg., and E. Bergstrom, 1136 Citizens Natl. Bank Bldg., Los Angeles, archts. Noted Aug. 7.

Conn., Stamford—ALMS HOUSE—Nov. 12, by City, Municipal Bldg., brick alms house, $150,000. Coffin & Coffin, 522 5th Ave., New York, archts. Noted Sept. 4.

La., Baton Rouge — CAPITOL — State of Louisiana, c/o H. P. Long, gov., bids about Nov. 4, equivalent to 26 story, rein.-con., steel, limestone, hollow tile, marble, terrazzo, concrete piles and concrete matt found., Church St. between 3rd and 5th Sts., Weiss, Dreyfous & Seiferth, Maison Blanche Bldg., New Orleans, archt. Noted Feb. 20.

Mass., Billerica—HOUSE of CORRECTION—Nov. 4, by Middlesex Co. Comn., E. B. Barlow, chm., Cambridge, 3 story, basement, brick, stone, rein.-con., steel, plain found., on Maloney Estate, South Billerica, $1,000,000; heating and ventilating, exceed $25,000; plumbing, to exceed $25,000; electrical work, $25,000 or more. C. R. Greco, 11 Beacon St., Boston, archt. Noted Sept. 18.

Mass., Stoneham—LIBRARY—Town, H. H. Richardson, in charge, Town Hall, taking bids 2 story, basement, brick, limestone, granite, plain found., Main St. $150,000. Coolidge & Carlson, 89 State St., Boston, archts. Noted Sept. 4.

N. J., Irvington (br. Newark)—FIRE HOUSE—Bd. Town Council, 1253 Clinton Ave., bids about Nov. 15, 2 story, brick, steel, Grove St. and 18th Ave. $150,000. G. F. Lederer, 2 Union Ave., archt. Noted Oct. 16.

CONTRACTS AWARDED

Mich., Plymouth—PRISON—Detroit House of Correction, Alfred St., Detroit, general contract 2 and 3 story, brick, rein.-con., steel administration building, cell block, dining hall and kitchen for men's prison, plain found., to Martin & Krausmann Co., 955 East Jefferson Ave., Detroit, $396,090.

BUILDINGS—UNCLASSIFIED

PROPOSED WORK

Calif., Los Angeles—CHEMICAL—Owl Drug Co., 551 South Bway., plans by E. Bergstrom, 1136 Citizens Natl. Bank Bldg., 5 or 6 story, 50 x 150 ft., 8th and Flower Sts. $150,000.

Calif., Los Angeles—MARKET—Gore Bros., c/o Balch & Stanberry, archts., Film Exch. Bldg., 1 story, basement, 150 x 180 ft., rein.-con., Beverly Blvd. $150,000.

Conn., Hartford—HISTORICAL—Connecticut Historical Society, 624 Main St., brick, steel historical building, $400,000. Architect not selected.

Conn., Mystic—ART—Mystic Art Assn., Inc., G. A. Thompson, plans by Jackson, Robertson & Adams, 1216 Turks Head Bldg., Providence, R. I., brick, stone. $150,000 plus.

Kan., Wichita—ART INSTITUTE—Bd. Park Comrs., City Hall, postponed indefinitely art institute, C. S. Stein, 56 West 45th St., New York, archt. Noted Mar. 13.

Mass., Cambridge — DORMITORY — A. H. Graustein, 19 Arlington St., sketches 3 story, basement, brick, stone dormitory to house Harvard College Students, plain found., Arlington St. Est. exceeds $150,000. Private plans.

Mass., Framingham — EXCHANGE — New England Telephone & Telegraph Co., 50 Oliver St., Boston, soon takes bids 3 story, basement, 50 x 100 ft., stone, steel, rein.-con., concrete found., Lexington Ave. and Union St. $150,000. R. C. Sturgis, 120 Boylston St., Boston, archt. Noted Oct. 2.

Mass., Worcester—STORAGE WAREHOUSE TERMINAL—Northeastern Storage & Distribution Co., J. S. Gerety, 94 Grafton St., sketches by F. B. Hoffman, 147 East 61st St., New York, 180 x 640 ft., brick, steel, concrete, Arctic St. $900,000.

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Mo., St. Louis—EXCHANGE—Southwestern Bell Telephone Co., 11th and Pine Sts., plans by I. R. Timlin, 1916 Telephone Bldg., 2 story, basement, 100 x 130 ft., rein.-con., brick, stone, January Ave. and Eichelbergers St. $850,000 incl. equipment.

N. J., Newark—RAILROAD STATION—Pennsylvania R.R. Co., T. J. Skillman, ch. engr., Broad St. Sta., Phila., Pa., plans by McKim, Mead & White, 101 Park Ave., New York, railroad station, Market and Canal Sts. **Maturity in spring.** Noted May 8.

N. J., Newark — TERMINAL and WAREHOUSE—Erie R.R. Co., G. S. Fanning, ch. engr., 50 Church St., New York, and Erie Industrial Terminal Co., 60 Park Pl., Newark, 8 story industrial terminal, Ogden and Gouveneur Sts. $2,000,000. Project in abeyance. Will probably abandon. Noted May 8.

N. J., Paterson—STATION and OFFICE—Erie R.R. Co., G. S. Fanning, ch. engr., 50 Church St., 12 story, basement, rein.-con., brick, steel, plain found., Ward St. $800,000. **Maturity probably after Mar. 1.** Noted May 8.

N. J., Trenton—PASSENGER STATION—T. J. Skillman, ch. engr., Broad Street Sta., Phila., Pa., general contract passenger station, South Clinton Ave. **Maturity in spring.** F. A. Dennison, 40 East 49th St., New York, archt. Noted Jan. 9.

N. J., West Long Branch—MAUSOLEUM—Glenwood Mausoleum Assn., J. S. Applegate, Broad St., Red Bank, mausoleum. $150,000. G. B. Webb, 10 East 43rd St., New York, archt. Noted Aug. 21. **Maturity after January.**

N. Y., Brooklyn—MAUSOLEUM—New York Mausoleum Assn., 7 DeKalb Ave., soon takes bids general and separate contracts 2 story, 79 x161 ft., mausoleum, Cypress Hills Cemetery, $700,000. G. B. Webb, 10 East 43rd St., New York, archt. Noted Oct. 16.

N. Y., New York—MARKET, etc.—Philip Ohl Market, lessee, 846 Amsterdam Ave., 75 x 94 ft. market, (refrigeration) store, apartment, 846 Amsterdam Ave. To exceed $150,000.

N. Y., New York — RESTAURANT, etc. — Childs Co., 200 5th Ave., plans by J. C. Westerveld, 36 West 34th St., restaurant, kitchen, storage, 136 William St. $150,000. Noted Oct. 9.

BIDS ASKED

Ind., Terre Haute — EXCHANGE — Indiana Bell Telephone Co., taking bids 4 story, basement, rein.-con., brick, stone, 7th and Ohio Sts, $200,000. Vonnegot-Bohn-Mueller, 610 Indiana Trust Bldg., Indianapolis, archts.

Kan., Wichita — COMMERCIAL — See "Contracts Awarded."

Mass., Holyoke—EXCHANGE—New England Telephone & Telegraph Co., 245 State St., Boston, taking bids 3 story, basement, 85 x 90 ft., brick, steel, plain found., $150,000. Densmore, Le Clear & Robbins, Park Sq. Bldg., Boston, archts. Noted Sept. 25.

N. J., Keyport—EXCHANGE—New Jersey Bell Telephone Co., 50 Broad St., Newark, bids about Nov. 1, general contract 2 story, basement, brick, steel telephone building, $150,000. H. B. Brady, Inc., 333 North Broad St., Newark, archts. Noted Oct. 9.

N. J., Newark—MARKET—F. H. Koenigsberger, archt., 48 Walnut St., bids about Nov. 1, general contract 2 story, basement, brick, steel, Washington and Linden Sts., for Steuben Holding Corp., 60 Park Pl. $150,000. Noted Oct. 16.

CONTRACTS AWARDED

Calif., Los Angeles—LABORATORY—Brunswig Drug Co., 501 North Main St., 5 story, basement, 177 x 250 ft., rein.-con., brick, steel, to Macdonald & Driver, Bd. of Trade Bldg., $350,000. Noted Aug. 28.

Calif., Los Angeles—PUBLISHING PLANT—Southern California Newspaper Assn., 510 South Spring St., 5 story, 115 x 130 ft., to H. W. Schlueter, 9300 Yoakum St., Beverly Hills, $170,000. Noted Oct. 9.

Kan., Wichita — COMMERCIAL — Brosius Investment Corp., Brown Bldg., 5 story, 100 x 120 ft., rein.-con., brick, terra cotta, separate contracts, $300,000, Montgomery-Ward Co., Chicago Ave. and Larr St., Chicago, Ill., lessee.

Mich., Muskegon—TERMINAL—W. S. Butterfield, 1592 Elizabeth St., Detroit, 1 story (ultimately several stories) part basement, 120 x 220 ft., brick, terra cotta, steel, concrete building for bus terminal and stores, plain found., Clay Ave., to Muskegon Constr. Co., Muskegon. Est. $250,000.

Mo., St. Louis — RESTAURANT — J. R. Thompson Co., c/o R. King Kauffman, 350 North Clark St., Chicago, Ill., 2 story, basement, 500 x 100 ft., 716-18 Olive St., to Krahl Constr. Co., 350 North Clark St., Chicago, Ill. Noted July 11.

N. J., Jersey City—GARAGE—Bergen Square Garage, c/o C. Shilowitz, archt., 26 Journal Sq., general contract 5 story, basement, brick, steel, to Fisher Williams Corp., 110 East 42nd St., New York. Est. $500,000. Noted Sept. 18.

O., Cleveland—SALES AND SERVICE—International Harvester Co., C. W. Mapes, branch mgr., East 30th St. and Chester Ave., 1 and 2 story, 100 x 125 ft., brick, steel, Chester Ave. and East 30th St., to Austin Co., 16112 Euclid Ave. Est. $150,000. Awarded about Sept. 15.

Buildings

FACTORIES AND MILLS

PROPOSED WORK

Calif., Fresno—IRON WORKS PLANT—Commercial Iron Wks., 2005 Bway., sketches plant on 25 x 130 ft. site, Echo Ave.

Conn., New Britain—PRINTING PLANT—New Britain Record, 25 Washington St., modern printing plant, Washington St. $75,000. Architect not selected.

Conn., Storrs — DAIRY, etc. — Connecticut Agricultural College, C. C. McCracken, pres., dairy and livestock building, $100,000. Architect not selected.

Ind., Wabash—FACTORY—Rock Insulator Co., 74 x 160 ft., brick, steel, rock wool fabricating factory, $50,000. Private plans.

Ia., Sioux City — MILK PLANT — Roberts Dairy Co. sketches by G. B. Hilgers, U. B. Bldg., 2 story, basement, 9th and Omaha Sts. $100,000.

La., Lake Charles—ICE PLANT—Magnolia Ice Co., Beaumont, Tex., plans by A. J. Alexander, Beaumont, Tex., and soon takes competitive bids 1 story, 50 x 90 ft., 45 ton, rein.-con., brick, plain found.

Minn., Mendota—OIL DISTRIBUTION PLANT—Great Lakes Pipeline Co., Ponca City, Okla., 2 m.g. oil distribution plant, near here. Private plans.

Miss., Vicksburg—PLANT—Yazoo Portland Cement Co., R. T. Miller, pres. and genl. mgr., has option on site to construct 1,000,000 bbl. per year cement plant.

N. J., Newark—FACTORY—Beacon Upholstery Co., c/o Siegler & Greenberg, archts., 164 Market St., 2 story, basement, 100 x 160 ft., brick, steel, rein.-con., Belmont and Hawthorne Aves., $75,000. **Maturity in 1931.** Noted Oct. 9.

N. Y., Maspeth — LAUNDRY — J. Hoffman, 8534 121st St., 75x100 ft. laundry, 55th St. and Nurge Ave., $40,000. **Maturity about June 1931.** H. Bruckner, 2424 Myrtle Ave., Brooklyn, archt. Noted Oct. 16.

N. Y., New York—BAKERY—Koenig Leeser Corp., 391 East 149th St., sketches by Siegel & Levy, 1775 Bway., 1 story, 100 x 100 ft. bakery, stores, Lydig and Barnes Ave. $40,000.

N. Y., Tonawanda—FACTORY—J. H. Williams Co., 400 Vulcan St., Buffalo, soon lets contract factory, $50,000. Noted July 10 under "Buffalo."

O., Cincinnati—FACTORY—Terre Realty Co., c/o J. A. Scanlon, Union Trust Bldg., plans by H. Hake, 24000 Gilbert Ave., 2 story, basement, 70 x 162 ft., brick, steel, Queen City, $50,000.

O., Cleveland — FACTORY, etc. — Powerlite Switchboard Co., J. F. Jirka, secy.-treas., 4119 East 79th St., plans by H. K. Ferguson Co., Hanna Bldg., 1 and 2 story, 50 x 122 ft., brick, steel factory, office addition, $50,000.

Okla., Oklahoma City — OIL REFINERY — Century Petroleum Co., R. S. Randerson, pres., Braniff Bldg., 3,500 bbl. oil refinery, 1800 East

Pa., New Castle—PLANT—Blair Strip Steel Co., G. D. Blair, Jr., pres., Butler Avenue Extension, rebuilding plant, Butler Avenue Extension, recently destroyed by fire, $500,000, Architect not selected. **Maturity probably in November.**

Pa., Uniontown — BAKERY — Seven Baker Brothers, L. J. Baker, pres., 400 Wabash Ave., Pittsburgh, plans by Braziell & Anderson, 300 4th Ave., Pittsburgh, 3 story, brick, steel, Mill St. $150,000.

Tenn., Knoxville—BAKERY—Brown, Greer & Co., 415 Union Ave., plans by W. E. Long & Co., 155 North Clark St., Chicago, Ill., 1 story, basement, 100 x 200 ft. bakery, $250,000, 4th St. $75,000. Private plans.

Tenn., Nashville—FLAKING MILL—Hart & Stone, archts., Hitchcock Bldg., soon lets contract 2 and 4 story, rein.-con., Franklin Pike, for Tennessee Cereal Co., Independent Life Bldg. $150,000.

Tex., Harlingen—REFINERY—Leo Petroleum Co., Fort Worth, and c/o J. F. Flore, Reese-Willmond Hotel Bldg., 2 story, brick, rein.-con. refinery, $125,000.

Tex., Jacksonville—FERTILIZER PLANT—Amer. Fertilizer & Chemical Wks., Georgetown, J. H. Thompson, 401 Andrews Bldg., Dallas, fertilizer plant, near here.

Tex., Pampa—ICE MANUFACTURING and COLD STORAGE PLANT—Southwest Food & Refrigerating Co., Pampa, c/o Chamber of Commerce offices, sketches 1 story, brick, rein.-con., probably 70 ton capacity ice plant, $100,000. Private plans.

Tex., Taylor—ICE PLANT—A. C. Clauznitzer, New Braunfels, sketches, brick, concrete, Kimbro St. on 2nd St.

Man., Winnipeg — BISCUIT FACTORY — Christie, Brown & Co. Ltd., 192-202 King St., East Toronto, Ont., plans by G. G. Teeter, 315 Parliament Bldg., 125 x 462 ft., brick, steel, rein.-con., Notre Dame Ave. $750,000.

N. S., Shelburne—COLD STORAGE PLANT—Shelburne Fisheries Ltd., cold storage plant, $50,000.

Ont., Gravenhurst—PLANT—Rainbow Craft Ltd., plans by Catto & Catto, 1 Wellington St., Toronto, 1 story, 80 x 250 ft. boat building plant, brick, steel. Interested in prices complete equipment.

Factories and Mills (Continued)

Ont., Hamilton—PRINTING PLANT—Reid Press Ltd., 25 McNab St., soon lets contract 1 story, basement, 146 x 231 ft., brick, rein.-con., stone. $75,000. R. E. McDonnell, Lister Bldg., archt. Noted Sept. 4.

Que., Hull—PLANT—E. B. Eddy Co. Ltd., C. V. Caeser, genl. mgr., (1st unit) bleaching plant and water filtration plant, Laurier Ave. $1,800,000. Private plans.

BIDS ASKED

Calif., San Francisco—CASKET FACTORY—Stella Bros., 1410 Howard St., taking bids 3 story, rein.-con., Howard St. $50,000.

Ind., Elkhart—PACKING PLANT—Elkhart Packing Co., taking bids rein.-con., steel, brick. $41,000. H. Miller, Elkhart, archt.

Mass., Cambridge—MANUFACTURING—See "Contracts Awarded."

Mass., Everett—PLANT—Merrimac Chemical Co., Chemical Lane, taking bids 3 story, 70 x 125 ft., brick, rein.-con. alum building. Chemical Lane, concrete found. $60,000. Private plans.

N. Y., Brooklyn — BAKERY — Oct. 27, by G. F. Stuhmer Co., 570 7th Ave., altering bakery, Park Ave. and Taafe Pl. $40,000. J. H. Knubel, 570 7th Ave., New York, archt.

CONTRACTS AWARDED

Calif., Los Angeles—PLANT, etc.—Oliver Farm Equipment Sales Co., West 11th St., 120 x 153 ft. plant, 76 x 120 ft. warehouse, 40 x 120 ft. parts dept. building, all 1 story, brick, stucco, incl. spur tracks, 4 shipping doors, loading dock, Hostetter Industrial Dist., West 11th St., to Austin Company of California, 777 East Washington St., $50,000.

Conn., Stamford—FACTORY—H. E. Minnerly, 38 Hobson St., 2 story, 30 x 125 ft., brick, steel, Sunnyside Ave., to Genovese & Rich, 280 Atlantic St. Est. $40,000.

Conn., Orange—FACTORY—George's Honeykist Popcorn Co., Inc., c/o L. J. A. Julianelle, archt., 42 Church St., New Haven, 1 story, 50 x 200 ft., brick, steel. $55,000. Owner builds. Noted Sept. 11.

Fla., Lake Wales—CANNING PLANT—Ridge Canneries Co., H. S. Norman, prop., 100 x 200 ft., welded steel arch plant, to Arch Eng. & Constr. Co., Lake Wales. Noted Aug. 21.

Ind., Ft. Wayne—FACTORY—W. J. Steckbeck, 2217 West Lafayette St., general contract brick, steel, terra cotta, 2217 South Lafayette St., to W. P. Schrenkel, 1811 Franklin St. Est. $42,000.

Mass., Cambridge — MANUFACTURING — Dewey & Almy Chemical Co., 235 Harvey St., 1 story, brick, plain found., Harvey St., separate contracts. $50,000. H. L. Kennedy, 80 Boylston St., Boston, archt.

Mass., Everett — CHEMICAL PLANT — Merrimac Chemical Co., 1 story, brick, steel addition, Chemical Lane, to J. F. Griffin Co., 250 Stuart St., Boston. Est. $50,000.

N. J., Newark — FACTORY — M. N. Shoemaker, archt., 10 Bleecker St., bids about Nov. 1, general contract altering 2 story, basement, brick, steel, rein.-con., 361-65 6th Ave., for Weldon Roberts Rubber Co., 18 Oliver St. $40,000. Noted Oct. 9.

N. J., Cranbury — FIREWORKS PLANT — Unexcelled Mfg. Co., 22 Park Pl., New York, group buildings, day labor and separate contracts. $100,000. Private plans. **Maturity in 1931.** Noted July 3.

O., Cincinnati—FACTORY—Jackson Box Co., 4927 Beech Ave., 1 story, brick, steel, 4927 Beech Ave., to Austin Co., 16112 Euclid Ave., Cleveland. Est. $100,000.

O., Cincinnati—LAUNDRY—Wet Wash Laundry Co., 1924 Dana Ave., 2 story, basement, 81 x 100 ft., brick, steel, rein.-con., plain found., Dana Ave., to Ferro Constr. Co., 3rd and Elm Sts., $60,000.

O., Willard—FACTORY—Company (to be organized), T. W. Beelman, at head, Willard Burial Vault Co., 1 story, 40 x 130 ft. grave vault factory, concrete, steel, to Beelman Mfg. & Lumber Co., Willard, $28,000. Noted Oct. 9.

Okla., Chickasha—COTTON OIL REFINERY—Chickasha Cotton Oil Co., 3 story, 53 x 119 ft., rein.-con., to W. E. Wdmiston, Chickasha.

Pa., Neville Island (mail McKees Rock) — REFINERY—Gulf Refining Co., Frick Bldg., Pittsburgh, and 21 State St., New York (3rd and last unit) incl. 24 x 113 ft. transfer pump house, 54 x 107 ft. treating plant pump house, 25 x 32 ft. accumulation building, 42 x 62 ft. compressor building (foundation completed), 61 x 79 ft. hot oil pump house, 18 x 25 ft. acid concentrator building, all brick, stone, 46 x 65 ft. caustic plant, 30 x 35 ft. dye house and dye sulphur and clay storage (foundation completed), 16 x 22 ft. causing head pump house, all corrugated siding, Eastern End, to Landau Bros. Contg. Co., 125 1st Ave. Total est. $1,500,000.

R. I., Pawtucket — PLANT — J. D. Crosby Co., Dean St., 2 story, brick, steel addition, Dean St., to Central Eng. & Constr. Co., 210 South Main St. Est. $40,000.

Ont., Copper Cliff — REFINERY — International Nickel Co., of Canada, Ltd., steel for No. 1 refinery unit, to Dominion Bridge Co., 1111 Beaver Hall Bldg., Montreal, Que., $500,000. Noted Sept. 11.

Ont., Toronto—SIGN PLANT—N. A. Armstrong Co. Ltd., archts., 7 King St. E., general contract 2 story, basement, 90 x 200 ft., brick, steel, concrete, to A. Weller & Co. Ltd., 54 Tecumseh St., for Flexlume Sign Co. Ltd., 1074 Queen St. E. Est. $100,000. Noted July 31.

GARAGES

PROPOSED WORK

Mass., Whitman—E. F. Carey, 55 George St., plans by W. Littlefield, Concord St., Rockland, rebuilding 1 story, brick, rein.-con., steel bus garage, concrete found., recently destroyed by fire, George St. $60,000. Noted Oct. 9.

N. Y., New York—A. J. C. Corp., 704 East 133rd St., plans by P. J. Murray, 14 West 45th St., 2 story, 90 x 245 ft., brick garage, laundry, Barry St. and Burnett Pl. $250,000.

N. Y., New York—Harrod Holding Corp., S. Kusnetz, pres., 1101 Manor Ave., sketches by J. Bleich, 4756 3rd Ave., 2 story, 110 x 144 ft. service garage, Antin Pl. and Brady Ave. $70,000.

O., Cleveland—Cleveland Wire Wks. of National Lamp Co., C. J. Edwards, engr., Nela Park, 1 story, 95 x 106 ft., brick, steel garage, Chardon Rd. $40,000. Private plans.

Pa., Sharon—Pennzoil Co., A. Fox in charge, Drake Theatre Bldg., Oil City, and A. W. Whalen, archt., Academy Ave., Mt. Lebanon, soon let contract, 1 story, 50 x 71 ft., stone, tile gasoline service station, East State St. and Wendler Ave. $40,000.

BIDS ASKED

Mass., South Boston (sta. Boston) — See "Contracts Awarded."

N. J., Jersey City—J. Goldenberg, 80 Woodland St., Englewood, bids about Mar. 1, general contract 4 story, basement, 90 x 150 ft., brick, steel, rein.-con. garage, showrooms, Sip and Summit Aves. $250,000. C. Shilowitz, 26 Journal Sq., archt.

N. J., Plainfield — Pub. Serv. Co-Ordinated Transport, Terminal Bldg., Newark, taking bids general contract 1 story, 100 x 170 ft., brick, steel garage addition, plain found. $150,000. Private plans.

CONTRACTS AWARDED

Mass., Cambridge—Amer. Oil Co. of Massachusetts, 465 Rindge Ave., superstructure 1 and 2 story, basement, irregular sized, brick, rein.-con., steel garage and service station, concrete found., Mt. Auburn St., to Frankini Bros. Co., Inc., 30 Mystic Ave., Medford. Est. $60,000. Noted Aug. 28.

Mass., Natick — Mexican Petroleum Corp., Park Sq. Bldg., Boston, 1 story, brick, concrete, steel service garage and gas station, concrete found., to J. W. Ferris Co., Inc., 11 Peabody St., Peabody. Est. $40,000. Noted Sept. 11.

Mass., South Boston (sta. Boston) — Greyhound Garage, c/o Eisenberg & Feer, archts., 11 Beacon St., Boston, altering 1 story, concrete, steel service garage, plain found., 571-583 East 1st St., separate contracts. Est. $40,000. Noted Oct. 9.

N. Y., Long Island City—Brein Holding Corp., 247 Langford Ave., 2 story, 125 x 192 ft., brick, steel service garage and storage, to Sclammenniti & Terra Nova, 1440 Bway., New York. Est. $40,000. Noted Oct. 16.

SHOPS AND FOUNDRIES

PROPOSED WORK

Calif., San Francisco — SHOP and WAREHOUSE — Soule Steel Co., 916 Rialto Bldg., plans by J. A. Cole, 2178 Oregon St., Berkeley 1 story, steel, Army St. $40,000.

Mass., Malden — SERVICE STATION — Malden Electric Co., 157 Pleasant St., service station. $50,000. Private plans.

Mich., Detroit—MACHINE SHOP—Wayne Co. Rd. Comn., 3800 Barlum Tower, 1 story, 60 x 100 ft., brick, steel, concrete monitor type machine shop, plain found., Wyoming Ave. $40,000. Giffels & Vallet, 604 Marquette Bldg., engrs.

Mo., St. Louis—PAINT SHOP—Amer. Car & Fdry. Co., 2800 De Kalb St., St. Louis, Mo., and 30 Church St., New York, 2 story, 16 x 1,680 ft., rein.-con., brick, steel addition, Dorcas St. near Main St. **Maturity in spring.** Private plans.

N. Y., Brooklyn—WORK SHOP—Donigan & Nielson, 3rd Ave. and 24th St., sketches by S. L. Malkind, 93 Court St., work shop, 3rd Ave. and 24th St. $40,000.

BIDS ASKED

Mass., Pittsfield—TRANSFORMERS TANK SHOP—Oct. 25, by General Electric Co., E. A. Wagner, genl. mgr., 1 story, 150 x 550 ft., steel, glass, transformer tank shop, incl. 1,500 tons structural steel, Tyler St., $1,000,000. Private plans. Noted Oct. 9.

POWER PLANTS

PROPOSED WORK

Ga., Elberton—City, A. Hawer, mayor, hydro-electric plant. Constitutional amendment to allow city to issue bonds to be voted on at Nov. 4 election. H. S. Jandon Eng. Co., Elberton, engrs.

Okla., Fairfax—City, sketches electric light plant, $50,000. Private plans. J. N. Fly, city clk.

B. C., Rossland—See "Dams."

CONTRACTS AWARDED

Kan., Kansas City—City Clerk, power plant improvements, incl. 100 ton traveling crane, Contr. 13, to Manning, Maxwell & Moore Co., Inc., Railway Exch. Bldg., St. Louis, Mo., $20,335; turbine-driven exciter set and motor-generator set, Contr. 14, to Westinghouse Electric & Mfg. Co., 2124 Wyandotte St., Kansas City, Mo., $4,125 and $698 respectively. Grand total $25,158.

Mass., Bridgewater—Commonwealth of Massachusetts, Dpt. Correction, State House, Boston, 1 story boiler house at State Farm, incl. 2 new boilers, to Pilgrim Constr. Co., Bridgewater. Est. $40,000. Noted Feb. 20.

Minn., Thief River Falls—City, P. C. Pederson, city clk., 1 story power house, 35 kw. motor driven exciter set, 4 panel switchboard, 20,000 gal. fuel oil storage tank, 750 B.P.H., to Dickinson Constr. Co., Bemidji. $80,000.

Pa., Tarentum—Boro, L. R. Conroy, secy., Boro Bldg., power station equipment, for light plant, 5th St., incl. furnishing, installing, testing 1,000 kw. at 80% power factor, 2,300 volt turbine driven alternator, with surface condenser and appurtenances, 50 kw. 125 volt combined steam electric driven exciter set, necessary electric wiring, switchboard alterations and additions, to Elliott Co., Frick Bldg., Pittsburgh; boiler plant equipment, incl. furnishing, installing, testing 442 hp. water tube boiler super-heater stoker blower, soot blower, with setting automatic damper and feed water regulator flue, auxiliaries, to Babcock Wilcox Co., Koppers Bldg., Pittsburgh. Est. $150,000. Noted Aug. 21.

R. I., Providence—Narragansett Electric Co., Old Industrial Trust Bldg., 3 story, 35 x 40 ft., brick, steel, concrete substation addition, to New England Power & Constr. Co., Harris Ave. Est. $40,000, incl. equipment.

WAREHOUSES

PROPOSED WORK

Conn., Hartford—Hardware City Storage Co., E. W. Schultz, pres., 242 Main St., sketches by Kingsley Service Co., 103 West 125th St., New York, 5 story, basement, 50 x 100 ft., brick, steel storage building, 405 Main St. $150,000. **Maturity about Dec. 1.**

Mass., Worcester—Northeastern Storage & Distributing Corp., J. S. Geraty, pres., 53 Grafton St., soon takes bids general contract warehouse and freight terminal, Grafton St. and Keefe Pl. To exceed $150,000. J. Rice & F. B. Hoffman, 147 East 51st St., New York, archt.

N. J., Newark—L. Bamberger & Co., Market St., 8 story, basement, brick, rein.-con. warehouse, plain found. $250,000. Abbott Merkt & Co., 175 5th Ave., New York, archts. **Maturity probably in spring.** $250,000. Noted Jan. 2.

N. Y., New York—Pasquale Santini, Inc., plans by Epple & Kahrs, 44 Commerce St., Newark, N. J., altering and constructing 10 story, 25 x 112 ft. addition to storage and warehouse, Macombs Rd. and 70th St. $150,000.

BIDS ASKED

Calif., Los Angeles — Los Angeles Co., 2 bridges, one over North Fork, other over West Fork river on Crystal Lake Rd. in San Gabriel Canyon, to E. G. Perham, 1128 Stearns Dr., $25,000.

N. Y., Long Island City — See "Contracts Awarded."

N. Y., New York—See "Bids Asked."

N. Y., Woodside—Rubel Ice Co., 937 Fulton St., Brooklyn, taking bids general contract 47x80 ft. ice storage, Peel and Fillmore Sts. $40,000. Cohn Bros., 350 Stone Ave., archts. Noted Oct. 16.

CONTRACTS AWARDED

N. Y., Brooklyn—Franklin F. P. Warehouses, Inc., 84 Rockwell Pl., 9 story, 99 x 100 ft. storage warehouse, to Turner Constr. Co., Graybar Bldg., New York. Est. $250,000. Noted Sept. 11.

N. Y., Jamaica—Norman Russell Constr. Co., general contract 6 story, basement, 62x115 ft. addition to Queensboro Storage Warehouse, to Turner Constr. Co., Graybar Bldg., New York. Noted Oct. 16.

N. Y., Long Island City—Boem Realty Corp., 250 Park Ave., New York, altering warehoue, Queens Blvd. and Van Dam Ave., day labor and separate contracts, furnishing, installing elevators, to Otis Elevator Co., 41-25 29th St. Est. $150,000. Noted Oct. 16.

N. Y., New York—One Hundred Eleven West End Corp., c/o J. A. Delehanty, 115 Bway., or DePace & Juster, archts., 151 West 46th St., bids about Nov. 3, general contract warehouse, West End Ave., 64th and 65th Sts. $1,500,000. Foundations awarded.

Tenn., Knoxville—National Biscuit Co., 715 Chamberlain Ave. and 447 West 14th St., New York, 1 story, 54 x 126 ft., brick, concrete distribution warehouse, to V. L. Nicholson Co., 102 West Clinch Ave. $40,000.

See proposal advertising on page 93

Constr. News page 175

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